

PERSONNEL
QUALIFICATION STANDARD
FOR
FF-1052 CLASS
COMMAND AND CONTROL
QUALIFICATION SECTION 4
WEAPONS CONTROL

CHIEF OF NAVAL EDUCATION AND TRAINING
MARCH 1976

"LET EVERY MAN KNOW -

his job
his place in the ship.
his responsibilities to his shipmates
and his purpose in fighting."

INTRODUCTION

This publication has been written with one guiding precept in mind; that "every sailor wants to do a good job and will perform that job well, if he is (1) sufficiently motivated, (2) properly instructed as to the scope and contents of his duties and, (3) has the depth of knowledge he needs to fulfill his responsibilities." This Personnel Qualification Standard will assist you by providing a systematic approach to studying the material that is essential to your becoming a more productive member of the "combat ready qualified Navy team."

A brief explanation of the features of the Personnel Qualification Standard will help you understand how to use it.

First, do not let yourself become concerned with the physical thickness of the booklet and the quantity of words on each page. A broad but detailed knowledge of a subject is composed of many short answers to many types of questions. It takes a lot of words to ask these simply answered questions in a concise manner.

The format of the Personnel Qualification Standard and its numbering system forms a definite educational pattern. However, this pattern DOES NOT LIMIT either the instructor or the student to any sequence, method or technique of instruction.

The Personnel Qualification Standard has the following four main subdivisions:

- 100 Series THEORY
- 200 Series SYSTEMS
- 300 Series WATCHSTATIONS
- 400 Series QUALIFICATION CARDS

100 Series - THEORY

This section of the Personnel Qualification Standard specifies the theory background that will be required as prerequisites to the commencement of study in the specific equipment(s) for which this booklet is written. Normally, you would have acquired these fundamentals during the school phase of your training. If you have not been to school, the requirements are outlined and referenced to aid you in a self-study program.

200 Series - SYSTEMS

In this portion, the equipment you are studying is broken down into functional sections. These functional sections can be studied and your achievement tested either orally or in writing in a reasonable amount of time. Words such as sub-assembly, drawer, unit, cabinet, etc., have been deliberately avoided because they more specifically refer to construction features deemed necessary by the manufacturer. "Physical boundaries" are more often distinctly different from the "functional boundaries;" for example, a system may have a lever, valve, switch, or antenna functionally connected to it but physically located in a different space. For a complete understanding, all functional parts must be considered in the study of the system.

In the 200 series there is a pattern to the numbers to the right of the decimal point as follows:

- .1 At this point you will always be asked to explain the function of the system.
- .11 Here you will be asked to draw a simplified version of the system from memory.
- .12 Refer to a standard print.
(You will be asked to use either the simplified version or the standard print as a reference while studying the system.)
- .2 SYSTEM COMPONENTS - GENERAL
The system's components are listed in this section and you will be told what you must learn about each component. Please note the definition of "component" is not restricted to a single piece of hardware with a single stock number. It may be either a single resistor or an entire pump assembly. Note also that component .29 is followed by component .210 vice .30. This is done to indicate the tenth, item in the .2 list, etc.
- .3 COMPONENT PARTS
This section breaks down the components into their component parts. Only those component parts essential to understanding the system are listed. Others, such as mounting bolts, brackets and chassis are not included.
- .4 PRINCIPLES OF OPERATION
Up to this point, the system has been considered from a purely "static" point of view (What the System does). In this section you will be called upon to evaluate and describe the "dynamic" characteristics of the system. (How the components and component parts work together to perform the function of the system).

.5 MAJOR PARAMETERS

Obviously, all the numerical values in any given system need not be memorized, but a few are vital. This section asks for those major parameters that you must be able to immediately call to mind while operating and maintaining the equipment.

.6 SYSTEM INTERRELATIONS

Up to this point your thinking has been directed to the system and its internal operations. Now your thinking will be expanded to include how this system fits into the total picture: (how this system is affected by the operation of other systems, and how other systems are affected by the operation of this system).

.7 SAFETY PRECAUTIONS

Here you will be called upon to discuss any special safety precautions unique to this system. These safety precautions apply to personnel and/or equipment.

300 Series - WATCHSTATIONS

This series includes the procedures you must know in order to properly operate and maintain the equipment. Do not let your thinking become limited to the concept that you stand watch only if your name is on a watch bill. In the Qualification Standard usage, you are considered to be at your watchstation anytime you face the equipment and use your intelligence to cause it to perform correctly or try to analyze malfunctions. While all possible procedures may not be detailed in this section, the procedures that you can reasonably be expected to complete are covered by an OPERATOR and TECHNICIAN watchstation. Each is explained in detail as follows:

(OPERATOR WATCHSTATION)

.1 OPERATING INSTRUCTIONS

As a result of your study of the 200 Series of the Qualification Standard, you know what the systems do, how they do it, and many other aspects of their operation. You have spent a lot of time acquiring the necessary knowledge, all of which is of little value to you and the Navy unless you are able to use it to perform in an efficient manner. In this section you will be directed to perform and discuss various aspects of procedures, demonstrating your ability to cope with the equipment(s) at your watchstation.

.2 NORMAL OPERATIONS

Here you will be directed to describe those conditions that exist that indicate the system is functioning properly.

.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

An abnormal condition is the first stage of a sequence of events that will lead to an emergency and/or casualty. You must be able to recognize the symptoms of these abnormal conditions and you must also know what immediate corrective action to take. In this section you will discuss the more pertinent of the abnormal conditions.

.4 EMERGENCIES and/or CASUALTIES

In this section you will discuss and/or perform when practicable the procedures for limiting the damage from the emergencies and casualties most pertinent to the watchstation.

.5 INFREQUENT and/or ABNORMAL OPERATIONS

This area is devoted to the discussion and/or performance when practicable of those procedures that are considered dangerous, too time consuming, or that occur too infrequently to be made mandatory performance items.

(TECHNICIAN WATCHSTATION)

.1 MAINTENANCE INSTRUCTIONS

In studying to be a technician, your operator knowledge will be expanded to include the maintenance of the equipments you have operated. In this section you will be directed to discuss and perform the routine maintenance checks, tests, alignments, repair, replacements, etc., that keep the equipment and machinery assigned to you in a "combat ready" condition.

.2 INFREQUENT and/or ABNORMAL MAINTENANCE OPERATIONS

As is true of the operator watchstation, there are infrequent and/or abnormal maintenance operations that are too time consuming to make them mandatory performance items. In this section you will be asked to discuss and perform those procedures when practicable.

400 Series - QUALIFICATION CARDS

The qualification standard has been written so that upon completion of all sections you will be able to both operate and maintain the equipments at your watchstation(s). In practice however, where you start in the standard will in part be determined by the needs of your command. Therefore, depending upon the immediate need for your services, you will be given a qualification card that will tell you which sections you must complete first.

The qualification cards reference the items you must complete in the 100, 200 and 300 Series of the Standard. The cards are your guide, reference, and record of achievement. The qualification cards are packaged separately from the standard and should be carried by you at all times to permit you to take advantage of every opportunity to complete the requirements.

You have been given the complete Qualification Standard in the belief that the truly conscientious sailor will make the extra effort to become fully qualified in all respects at the earliest opportunity.

That is the story of the QUALIFICATION STANDARD.

Now, TURN TO - GOOD LUCK!

GLOSSARY OF QUALIFICATION STANDARD TERMS

BLOCK DIAGRAM	A drawing of a system using blocks for components to show the relationship of components.
CASUALTY	An event or series of events in progress during which equipment damage and/or personnel injury has already occurred. The nature and speed of these events are such that proper and correct procedural steps will only serve to limit damage and/or personnel injury.
CLASSIFICATION AND/OR TYPE	To give the type of classification of various equipment, i.e., a. Check valve-swing, stop, etc. b. Valve-solenoid, manual, etc.
COMPONENT	The major units which when suitably connected comprise a system.
COMPONENT PART	The integral part of a component.
CONTROL POWER	Power used to control or operate a component or component part.
CONTROL SIGNAL	A signal used to activate control circuitry or indication, for example: The signal from a pressure switch.
EMERGENCY	An event or series of events in progress which will cause damage to equipment unless immediate, timely and correct procedural steps are taken.
FAIL	<ol style="list-style-type: none">1. The loss of control signal or power to a component.2. The breakage or breakdown of a component or component part.
FAIL POSITION	The operating or physical position to which a device will go upon loss of its actuating electrical, electronic, pneumatic, or hydraulic control signal.
FUNCTION	To perform the normal or characteristic action of anything, or special duty or performance required of a person or thing in the course of work.

INTERLOCK	A feature or device in one system or component that affects the operation of another system or component. Generally a safety device but may be used to control the operating sequence of components.
MONITORING POINT	The physical location at which any indicating device displays the value of a parameter at some control station.
ONE LINE SCHEMATIC DIAGRAM	A drawing of a system using only one line to show the tie-in of various components, i.e., the three conductors needed to transmit 3-phase power are represented by a single line.
SIMPLE SKETCH	A simplified pictorial illustration of a system.
OPERATING CHARACTERISTICS	The combination of a parameter and its setpoints.
PARAMETERS	A variable such as temperature, pressure, flow rate, voltage, current, frequency, etc., which may be indicated, monitored, checked or sensed in any way during operation or testing.
PROTECTIVE FEATURE	A feature of a component or component part designed to protect a component or system from damage.
SENSING POINT	The physical and/or functional point in a system at which a signal may be detected, monitored or may cause some automatic operation to result.
SETPOINT	The numerical value of a parameter at which: <ul style="list-style-type: none"> a. An alarm is actuated. b. Operator action is required. c. Proper operation ceases and damage may occur.
SPECIAL FUNCTION	A unique service performed by the system under discussion usually above and beyond the direct design intent of the system. These special functions have usually been provided by making small modifications to a simple system vice constructing a discrete system to perform a single evolution.

STANDARD PRINT	A standard drawing, schematic, or blueprint produced in the applicable technical manual, or other official technical publication.
SYSTEM	The major functional section of an installation selected for individual attention.
SYSTEM INTERRELATION	Specific individual operations in one system affecting the operation in another system under normal conditions which are not fully described in emergency or casualty procedures or in the functional discussion of the system.
WATCHSTATION	Duties, assignments or responsibilities which an individual or group of individuals may be called upon to carry out. Not necessarily a normally manned position with a "watchbill" assignment.
DEFINE	State meaning of; delineate.
DESCRIBE	Give a detailed account.
DISCUSS	Converse (exhibiting a basic understanding).
EXPLAIN	State reasons for; to make clear, plain or understandable.

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4102	ASW Weapons Employment
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4105	Gunnery (Preparation and Analysis)
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4108	Basic Point Defense (Terms and Definitions)
4109	Sound-Powered Telephone
4110	Aircraft Characteristics (SH-2F)
4111	Aircraft Safety Precautions
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4113	General Safety Precautions

SYSTEMS

4201	Antisubmarine Warfare Weapons
4202	Underwater Battery Plot Control Indicator (UBCI)
4203	MK 53 Upper Attack Dial
4204	MK 53 Upper Ballistic Plotter
4205	MK 53 Upper Ballistic Dial
4206	MK 53 Firing Panel
4207	MK 53 Fuse Panel Assembly
4208	MK 53 Desk Assembly
4209	MK 199 Launcher Captain Control Panel
4210	MK 134 Stabilization Computer
4211	MK 43 Relay Transmitter
4212	MK 44 Relay Transmitter
4213	MK 78 Position Indicator
4214	MK 112 ASROC Launcher
4215	ASROC Weapon
4216	Magazine Sprinkling (Wet)
4217	SH-2F Helicopter (LAMPS)
4218	MK 32 Surface Vessel Torpedo Tubes (SVTT)
4219	T-MK-6 Torpedo Countermeasures
4220	MK 68 Gunfire Control
4221	MK 68 Gun Director
4222	MK 47 Computer
4223	AN/SPG-53 Series Gunfire Control Radar
4224	MK 16 Stable Element
4225	MK 68 Gunfire Control Auxiliary Equipment
4226	MK 68 Gunfire Control Communications
4227	Target Designation
4228	MK 115 Fire Control
4229	MK 25 Missile Launching
4230	45-Caliber Pistol

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WATCHSTATIONS

4301	Underwater Battery Plot Control Indicator Operator
4302	MK 53 Attack Plotter Unit Operator
4303	MK 53 Ballistic Computer Unit Operator
4304	MK 199 Launcher Captain Control Panel Operator
4305	MK 43 Relay Transmitter Operator
4306	T-MK-6 Torpedo Countermeasures Operator
4307	Magazine Sprinkler (Wet) System Operator
4308	Flight Deck Safety Officer
4309	Helicopter Director LSE/LSO
4310	MK 68 Director Officer
4311	MK 68 Director Tracker
4312	MK 68 Rangefinder Operator
4313	AN/SPG-53 Series Radar Operator
4314	MK 47 Computer Operator
4315	MK 16 Stable Element Operator
4316	MK 68 Firing Key Operator
4317	Basic Point Defense Missile System Controller
4318	MK 76 Director Illuminator Operator
4319	Sound-Powered Phone Talker
4320	ASROC Sentry

4101 ASW FIRE CONTROL (SYMBOLS) THEORY

This section identifies the terms, principles, and laws of ASW FIRE CONTROL (SYMBOLS) THEORY. Reference used was:

- a. NAVSEA OP 2892, Vol. I

4101.1 SYMBOLS

- .11 Name and define the following symbols:
 - a. Basic fire control
 - b. Quantity modifier
 - c. Numerical quantity modifier
 - d. Quantity
- .12 Give the geometric definition of all symbols.

4102 ASW WEAPONS EMPLOYMENT THEORY

This section identifies the terms, principles, and laws of ASW WEAPONS EMPLOYMENT THEORY. Reference used was:

- a. ATP 28/USN Addendum

4102.1 BASIC FUNDAMENTALS

- .11 List the authoritative manuals and/or instructions used by your command.
- .12 List the common symbols and nomenclature used in conjunction with anti-submarine employment.
- .13 Explain the application and use of the following:
 - a. Rocket-thrown torpedos
 - b. Rocket-thrown depth charge
 - c. Over-the-side torpedos
- .14 Discuss/explain the following launching devices:
 - a. Launching group MK 16
 - b. Torpedo tubes MK 32
- .15 Identify the equipments that comprise the fire control system in relation to their name and function.

4103 5"/54 MK 42 MOD 9/10 THEORY

This section identifies the terms, principles and laws of 5"/54 MK 42 MOD 9/10 THEORY. References used were:

- a. 5"/54 MK 42 MOD 9 (NAVSEA OP 3851)
- b. 5"/54 MK 42 MOD 10 (NAVSEA OP 3713)
- c. Gunner's Mate 3 & 2

4103.1 CAPABILITIES

- .11 Define and explain the following performance capabilities of the 5"/54 Gun Mount:

- a. MK 42 MOD 9/10:
 - 1. Rate of fire
 - 2. Maximum range
 - 3. Altitude
 - 4. Train and elevation limits
 - 5. Initial velocity
 - 6. Surface targets
 - 7. Shore bombardment
 - 8. Air targets

4103.2 CHARACTERISTICS

- .21 Indicate an understanding of the following characteristics of 5"/54 MK 42 MOD 9/10 by describing:
- a. One-sided operation
 - b. Two-sided operation
 - c. Gun loading system capacity
 - d. Stationary components
 - e. Independent mechanism
 - f. Rotating components
 - g. Reduce manning
 - h. Maintainability
 - i. Reliability

4104 GUNNERY (TERMINOLOGY AND STANDARD COMMANDS) THEORY

This section identifies the terms, principles, and laws of GUNNERY (TERMINOLOGY AND STANDARD COMMANDS) THEORY. References used were:

- a. COMCRUDESANT and COMCRUDESPAC Gunnery Notes
- b. Fire Control Technician G 3 & 2
- c. Fire Control Technician G 1 & C

4104.1 TERMS AND DEFINITIONS

.11 Define the following terms:

- a. Standby
- b. Checksight(s) on target
- c. Ready
- d. Manned
- e. Manned and ready
- f. Stand easy
- g. Ready air/surface
- h. Silence
- i. Carry on
- j. Target designation
- k. On target
- l. Locked on target
- m. Gated
- n. Air/surface/sub/land action
- o. Plot set
- p. In automatic
- q. In the stops
- r. Control plan
- s. Radar control
- t. Partial radar control
- u. Optical control
- v. Local control
- w. Rapid continuous fire
- x. Salvo fire
- y. Commence fire
- z. Check fire
- aa. Cease fire
- ab. Cease tracking
- ac. Load
- ad. Shoot
- ae. Spot
- af. Misfire
- ag. MPI
- ah. Hitting space
- ai. Danger space
- aj. MIL
- ak. Destruction
- al. Neutralization

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4104.2 STANDARD COMMANDS

- .21 Explain the standard commands and phraseology used on sound-powered phones.

4105 GUNNERY (PREPARATION AND ANALYSIS) THEORY

This section identifies the terms, principles, and laws of GUNNERY (PREPARATION AND ANALYSIS) THEORY. References used were:

- a. COMCRUDES LANT and COMCRUDES PAC Gunnery Notes
- b. Fire Control Technician G 1 & C
- c. NWIP 50-1

4105.1 TERMS AND DEFINITIONS

.11 Explain the following terms:

- a. Transmission checks
- b. Battery alignment
- c. Initial velocity (IV):
 - 1. ACTH
 - 2. Bore erosion
 - 3. Nomogram
 - 4. Pseudoequivalent service rounds (P.E.S.R.)
 - 5. Powder index

4105.2 INITIAL VELOCITY

- .21 Describe the elements that affect initial ballistic computations.
- .22 Explain the methods of determining velocity loss due to the erosion of the gun.
- .23 Explain how initial velocity is computed.

4106 DOPPLER THEORY

This section identifies the terms, principles, and laws of DOPPLER THEORY. Reference used was:

a. NAVSEA OP 3467

4106.1 PHYSICAL LAWS, PRINCIPLES AND FUNDAMENTALS

- .11 Explain the Doppler Principle.
- .12 Describe the use of the Doppler Principle as it pertains to BPD.

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4107 MISSILE GUIDANCE THEORY

This section identifies the terms, principles, and laws of MISSILE GUIDANCE THEORY. Reference used was:

a. NAVSEA OP 3744

4107.1 DRAWINGS, SYMBOLS AND PUBLICATIONS

- .11 List the authoritative manuals or instructions used by your unit.

4107.2 PHYSICAL LAWS, PRINCIPLES AND FUNDAMENTALS

- .21 Explain the Semiactive Homing Principle.
.22 Describe the use of the above principle as related to the Basic Point Defense Missile.

THE UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D. C. 20315

ADJUTANT GENERAL

TO: THE ADJUTANT GENERAL
FROM: THE ADJUTANT GENERAL
SUBJECT: THE ADJUTANT GENERAL

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4108 BASIC POINT DEFENSE (TERMS AND DEFINITIONS) THEORY

This section identifies the terms, principles and laws of BASIC POINT DEFENSE (TERMS AND DEFINITIONS) THEORY. References used were:

- a. NAVSEA OP 3656 (PMS/SMS)
- b. NAVSEA OP 3467 (PMS/SMS)
- c. NAVSEA OP 3973 (PMS/SMS)

4108.1 TERMS AND DEFINITIONS

.11 Define the following terms:

- a. Doppler
- b. Radial velocity
- c. In-range
- d. Launcher ready
- e. Missile ready
- f. Missile enabled
- g. Aim-dot
- h. Lock-on
- i. Firing zones
- j. Accept target designation
- k. Missile away
- l. Misfire
- m. Basic point defense (BPD)
- n. Daily systems operability test (DSOT)
- o. Fire control panel (FCP)
- p. Target designation converter (TDC)
- q. Director illuminator (DI)
- r. Target designation (TD)
- s. Launcher control panel (LCP)

4109 SOUND-POWERED TELEPHONE THEORY

This section identifies the terms, principles and laws of SOUND-POWERED TELEPHONE THEORY. Reference used was:

- a. Basic Military Requirements

4109.1 SOUND-POWERED TELEPHONE CIRCUIT

- .11 State the purpose of designating sound-powered telephone circuit(s).
- .12 Describe the significance of circuit nomenclature.
- .13 Describe the following sound-powered circuits in your subject area and the stations on each circuit:
 - a. JC
 - b. X43J
 - c. 2JP
 - d. X17J
 - e. X6J
 - f. 1JS
 - g. 8JP

4109.2 SOUND-POWERED TELEPHONE EQUIPMENT

- .21 Describe the following types of sound-powered telephone equipment:
 - a. Headset
 - b. Handset
 - c. Drum-type selector switch

4109.3 BASIC MESSAGE FORM

- .31 Describe the basic message form as consisting of the following:
 - a. Station called
 - b. Station calling
 - c. Test
 - d. Response

4109.4 PROWORDS AND PHRASES

- .41 Explain the meaning and use of the following prowords and phrases:
 - a. Silence on the line
 - b. Aye
 - c. Say again
 - d. Changing phones
 - e. Correction

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4109.4 PROWORDS AND PHRASES (CONT'D)

- f. Repeat back
- g. That is correct/wrong
- h. Belay my last
- i. Wait
- j. Back on the line

4109.5 PRONUNCIATION AND RULES OF NUMERALS

- .51 State the correct pronunciation of the numerals zero thru nine.
- .52 Explain the rules which apply to the pronunciation of numerals when used to indicate the following information:
 - a. Range
 - b. Distance
 - c. Speed/velocity
 - d. Courses
 - e. Bearing
 - f. Position angle
 - g. Altitudes

4110 AIRCRAFT CHARACTERISTICS (SH-2F) THEORY

This section identifies the terms, principles, and laws of AIRCRAFT CHARACTERISTICS (SH-2F) THEORY. Reference used was:

- a. NAVAIR 01-260HCD-1

4110.1 CHARACTERISTICS

- .11 Discuss the following characteristics of the SH-2F LAMPS helicopter:
 - a. Length
 - b. Rotor diameter
 - c. Static and minimum deck clearance of rotor blades
 - d. Weight limitations
 - e. Type of fuel
 - g. Fuel capacity
- .12 State the name and location of the crew stations.
- .13 Discuss the emergency rescue features of the aircraft and show where each is located.
- .14 Discuss aviation ordnance and describe where each of the following is located on aircraft:
 - a. CADS
 - b. Smoke markers
 - c. Torpedoes MK 44 and MK 46

4111 AIRCRAFT SAFETY PRECAUTIONS THEORY

This section identifies the terms, principles, and laws of AIRCRAFT SAFETY PRECAUTIONS THEORY. References used were:

- a. OPNAV 34-P1
- b. Squadron Pre-Mishap Plan
- c. NATOPS Manual

4111.1 GENERAL AIRCRAFT SAFETY

.11 Discuss the safety precautions associated with the following:

- a. Foreign object damage (FOD)
- b. Main/tail rotor arcs
- c. Exhaust area
- d. Grounding of aircraft
- e. Fueling and defueling
- f. Fuel and/or hydraulic leaks
- g. Handling oils and fuels

4111.2 FIRE AND FIREFIGHTING

- .21 Describe the four classes of fires.
- .22 State the procedures for reporting a fire.
- .23 State the recommended extinguishing agents for each class of fire.
- .24 State procedures concerning aircraft fire when ordnance is aboard.
- .25 State procedures for handling ordnance that has been inadvertently jettisoned/fired while aircraft is on deck.

4111.3 FIRST AID

- .31 Indicate an understanding of first aid procedures by describing:
 - a. The three basic rules in the treatment of wounds.
 - b. The symptoms of shock.
 - c. The treatment for shock.
- .32 Explain procedures for removing a victim of electric shock from an energized circuit.
- .33 Discuss the following techniques of artificial resuscitation:
 - a. Mouth-to-mouth
 - b. Back-pressure arm lift
- .34 Describe the three degrees of burns and how they are treated.
- .35 Show or describe the major pressure points on the body.

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4111.4 GROUND HANDLING SAFETY

- .41 Discuss the following safety precautions as related to ground handling:
 - a. Folding and spreading procedures
 - b. Personnel and procedures required to move an aircraft

4112 ORDNANCE SAFETY PRECAUTIONS THEORY

This section identifies the terms, principles, and laws of ORDNANCE SAFETY PRECAUTIONS THEORY. References used were:

- a. Gunner's Mate 3 & 2
- b. NAVSEA OP 3851, Vol. 1
- c. Clearing of Live Ammunition from Guns (NAVSEA OP 1591)
- d. Ammunition Afloat (NAVSEA OP 4)
- e. USN Ordnance Safety Precautions (NAVSEA OP 3347)

4112.1 TERMS

.11 Indicate an understanding of ordnance safety by explaining:

- a. Safety devices
- b. Safety watch for moving units
- c. Warning signals
- d. Designated use of explosives
- e. Purpose of safety link
- f. Precautions during AA firing

4112.2 FUNDAMENTALS OF OPERATION

.21 Indicate an understanding of ammunition handling and stowage by explaining, in terms of safety and/or effect, the following:

- a. Smokeless powder
- b. Handling
- c. Switches
- d. Magazines
- e. Altering ammunition

.22 Indicate an understanding of servicing guns by explaining procedures for/or precautions when:

- a. Opening breechblock
- b. Unloading gun
- c. Ramming
- d. Stowing fired cartridge cases
- e. Prematurely opening breech of loaded gun
- f. "Cease fire" when gun is loaded
- g. Fuzed projectile is in hot gun
- h. Hangfire
- i. Line of fire is obstructed
- j. Effects of loss of gas ejection air

4112

4112.2 FUNDAMENTALS OF OPERATION (CONT'D)

- .23 Indicate an understanding of equipment safety by discussing:
 - a. Hazards to personnel in operating spaces
 - b. Hazards of foreign material in operating spaces
 - c. Use of bore gauge
 - d. Purposes for protective fences
 - e. Procedure for working on slide or in gun pocket
 - f. Procedure for moving housing out of battery
 - g. Reasons for cable twist limits
 - h. Reasons for power off brakes
 - i. Reason for powder case and projectile load/unload doors
 - j. Effect of firing with gun tompion in place
 - k. Need for gun room ventilating system
 - l. The effects of a casualty to the cease fire alarm
- .24 Discuss the distinction between a "warning" and a "caution" as in equipment operating instructions.

4113 GENERAL SAFETY PRECAUTIONS THEORY

This section identifies the terms, principles, and laws of GENERAL SAFETY PRECAUTIONS THEORY. References used were:

- a. NAVSEA 0901-960-0001 (Chap. 60)
- b. Safety Precautions
- c. Electrician's Mate 3 & 2
- d. Manufacturers' Technical Manuals

4113.1 BODY RESISTANCE

- .11 Indicate an understanding of the effects of electricity on the human body by describing:
 - a. The effects of current flow on the body.
 - b. How various levels of potential affect current flow through the body.
 - c. How variations in environmental conditions affect body resistance.

4113.2 ENERGIZED CIRCUITS

- .21 Indicate an understanding of electrical safety precautions when working with energized circuits by describing:
 - a. How insulating materials are used to protect personnel.
 - b. The proper procedure to be followed prior to working on machinery or equipment.
 - c. The purpose of interlocks installed in/on electrical equipment.
 - d. The purpose and use of "DANGER" tags.
 - e. The safety precautions applicable to portable electrical equipment.
 - f. The dangers due to environmental conditions, of open electrical circuits.

4113.3 ELECTRICAL FIRES

- .31 Indicate an understanding of combating a class "C" fire by describing:
 - a. The procedures to be followed when combating an electrical fire.
 - b. The agents to be used to fight electrical fires (including proper application).

4113

4113.4 CLEANING AGENTS

- .41 Indicate an understanding of the recommended cleaning agents by describing:
 - a. The recommended cleaning agents for electrical equipment.
 - b. The desirable characteristics of a good cleaning agent for electrical equipment.
 - c. The hazards due to environmental conditions, which can be encountered with cleaning agents.

4113.5 COMPRESSED GASES AND CYLINDERS

- .51 Discuss the safety precautions involved in using high pressure air.
- .52 Discuss the safety precautions for handling compressed air/gas cylinders.

4201 ANTISUBMARINE WARFARE WEAPONS SYSTEM

4201.1 Explain the function(s) of the ANTISUBMARINE WARFARE WEAPONS SYSTEM as stated in ATP 28/USN Addendum and FXP-1.

.11 Refer to tables of this system as given in ATP 28/USN Addendum during the rest of this discussion.

4201.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show or describe the actual physical location of this component.
- C. State the number of weapons at each location.
- D. Describe the methods of launch.
- E. List or describe the mode(s) of operation.

.21	MK 44 torpedo	A	B	C	D	E
.22	MK 46 torpedo	X	X	X	X	X
.23	MK 17 depth charge	X	X	X	X	X
.24	Auxiliary firing enable/disable switch	X	X	X	X	X
		X	X			

4201.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4201.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- A. The preprogrammed search and depth function.
- B. How the search and depth function is programmed.

.41	MK 44 torpedo	A	B
.42	MK 46 torpedo	X	X
		X	X

4201.5 MAJOR PARAMETERS

- A. State the maximum speed at which target may be engaged.
- B. State the maximum run time.
- C. State the optimum firing range and/or firing angles.
- D. State the maximum acquisition range.
- E. State the maximum/minimum operating depths.
- F. State the search modes employed.

4201

4201.5 MAJOR PARAMETERS (CONT'D)

.51 MK 44 torpedo
.52 MK 46 torpedo
.53 MK 17 depth charge

A	B	C	D	E	F
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	

4201.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
1. Loss of underwater battery (UB) fire control inputs
 2. Loss of ship's service air
- B. There are no effect(s) due to the operation of this system to be discussed.

4201.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system
1. When handling extorps

4202 UNDERWATER BATTERY PLOT CONTROL INDICATOR (UBCI) SYSTEM

4202.1 Explain the function(s) of the UNDERWATER BATTERY PLOT CONTROL INDICATOR (UBCI) SYSTEM as stated in NAVSEA OP 3545, Volume 1.

- .11 Refer to a standard print of this system during the rest of this discussion.

4202.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Show or describe the actual physical location of this component.
 C. List or describe the source(s) of control signal(s).
 D. Describe the mode(s) of control.
 E. List the position(s) and function(s) of each position of this component.

	A	B	C	D	E
.21 MK 53 primary channel source selector range	X	X	X	X	X
.22 MK 53 primary channel source selector bearing	X	X	X	X	X
.23 MK 53 secondary channel source selector range	X	X	X	X	X
.24 MK 53 secondary channel source selector bearing	X	X	X	X	X
.25 AN/SQS-26 channel 1 designation select	X	X	X	X	X
.26 Illumination control	X	X			
.27 AN/SQS-26 channel 2 designation select	X	X	X	X	X
.28 AN/SQS-35 designation selector	X	X	X	X	X
.29 Range rate selector (nonfunctional)		X			
.210 MK 114 UBWCS SWBD ready/casualty indicators	X	X			
.211 Panel enable indicator	X	X			
.212 TDS director assigned indicator	X	X			
.213 UB director assigned indicator	X	X			
.214 Range rate mark indicators (nonfunctional)		X			
.215 Precision tracking indicators	X	X			
.216 Relative bearing warning indicators	X	X			
.217 OSMOS ON indicator	X	X			
.218 AN/SQS-26 channel 1 bearing indicator	X	X			
.219 AN/SQS-26 channel 1 range indicator	X	X			
.220 AN/SQS-26 channel 2 range indicator	X	X			
.221 AN/SQS-26 channel 2 bearing indicator	X	X			
.222 AN/SQS-35 range indicator	X	X			
.223 AN/SQS-35 bearing indicator	X	X			
.224 GWCS MK 68 range indicator	X	X			
.225 GWCS MK 68 bearing indicator	X	X			
.226 RVUA control/indicators group (nonfunctional)		X			
.227 On-target AN/SQS-26 channel 1 indicator	X	X			
.228 On-target AN/SQS-26 channel 2 indicator	X	X			

4202

4202.2 SYSTEM COMPONENTS - GENERAL (CONT'D)

	A	B	C	D	E
.229 On-target AN/SQS-35 UDS indicator	X	X			
.230 On-target AN/SQR-13 (padlock) indicator (non-functional)	X	X			
.231 Target depth RVUA valid indicator (nonfunctional)			X		
.232 GWCS MK 68 indicator	X	X			

4202.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4202.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4202.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4202.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Operation of AN/SQS-26 CX Sonar System
2. Operation of AN/SQS-35(V) Sonar System
3. Operation of MK 68 Gun Weapons Control System

B. Describe the effect(s) on the following, due to the operation of this system:

1. AN/SQS-26 CX Sonar System
2. AN/SQS-35(V) Sonar System
3. MK 68 Gun Weapons Control System

4202.7 SAFETY PRECAUTIONS

A. Discuss the following safety precautions unique to this system:

1. MK 53 primary/secondary source selector

4203 MK 53 UPPER ATTACK DIAL SYSTEM

4203.1 Explain the function(s) of the MK 53 UPPER ATTACK DIAL SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4203.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Explain the procedure for reading the dials.
- C. Explain the purpose for the lighted indicator.
- D. List the position(s) and function(s) of each position of this component.
- E. Show or describe the actual physical location of this component.

	A	B	C	D	E
.21 Target dial group	X	X			X
.22 Own ship dial group	X	X			X
.23 Range and bearing readings	X				X
.24 Display mode switch	X			X	X
.25 Director control pushbutton	X			X	X
.26 Speed analyzer switch	X			X	X
.27 Contact indicator	X	X			X
.28 Sonar indicator	X	X			X
.29 Radar indicator	X	X			X
.210 Director assigned indicator	X	X			X
.211 Missile tracking indicator	X	X			X
.212 Director control indicator	X	X			X
.213 Functions not in auto indicator	X	X			X
.214 Sonar not stabilized indicator	X	X			X
.215 Ballistic heat warning indicator	X	X			X
.216 Attack heat warning indicator	X	X			X
.217 Position keep indicator	X	X			X

4203.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4203.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4203.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4203

4203.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
1. Loss of 28V DC
 2. Loss of 115V AC 400-Hz
 3. Loss of 115V AC 60-Hz
- B. There are no effect(s) due to the operation of this system be discussed.

4203.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4204 MK 53 UPPER BALLISTIC PLOTTER SYSTEM

4204.1 Explain the function(s) of the MK 53 UPPER BALLISTIC PLOTTER SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4204.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. List the position(s) and function(s) of each position of this component.
- C. Show or describe the actual physical location of this component.

		A	B	C
.21	Plotter scale switch	X	X	X
.22	Computer mode switch	X	X	X
.23	Target speed handwheel	X		X
.24	Target course handwheel	X		X
.25	Plotting images	X		

4204.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4204.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4204.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4204.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Loss of 28V DC
2. Loss of 115V AC 400-Hz
3. Loss of 115V AC 60-Hz

B. There are no effect(s) due to the operation of this system to be discussed.

4204.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4205 MK 53 UPPER BALLISTIC DIAL SYSTEM

4205.1 Explain the function(s) of the MK 53 UPPER BALLISTIC DIAL SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4205.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Explain the procedure for reading the dial.
- C. Show or describe the actual physical location of this component.

	A	B	C
.21 Air density dial	X	X	X
.22 Time of flight dial	X	X	X
.23 Pattern radius dial	X	X	X
.24 Pattern angle dial	X	X	X
.25 Cutoff velocity dial	X	X	X
.26 Time to separation dial	X	X	X
.27 Effective range dial	X	X	X
.28 Water entry bearing dial	X	X	X
.29 Aiming range dial	X	X	X
.210 Launcher train order dial	X	X	X
.211 Launcher elevation order dial	X	X	X

4205.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4205.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4205.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4205.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Loss of 28V DC
2. Loss of 115V AC 400-Hz
3. Loss of 115V AC 60-Hz

4205

4205.6 SYSTEM INTERRELATIONS (CONT'D)

- B. There are no effect(s) due to the operation of this system to be discussed.

4205.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system
1. When launcher is energized and in remote

4206 MK 53 FIRING PANEL SYSTEM

4206.1 Explain the function(s) of the MK 53 FIRING PANEL SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4206.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Explain the indication of lighted indicator.
- C. List the position(s) and function(s) of each position of this component.
- D. Show or describe the actual physical location of this component.

	A	B	C	D
.21 Torpedo identification switch and display	X	X	X	X
.22 Tube selector switch and display	X	X	X	X
.23 Weapon selector switch and display	X	X	X	X
.24 System operation selector switch and display	X	X	X	X
.25 Bridge signal display	X	X		X
.26 Launcher status display	X	X		X
.27 Missile selector pushbutton	X		X	X
.28 Clear pushbuttons	X		X	X
.29 Depth set switches and display	X	X	X	X
.210 Weapon status display	X	X		X
.211 System firing key	X		X	X

4206.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4206.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4206.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4206.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Loss of 28V DC
2. Loss of 115V AC 60-Hz

4206

4206.6 SYSTEM INTERRELATIONS (CONT'D)

B. There are no effect(s) due to the operation of this system to be discussed.

4206.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4207 MK 53 FUSE PANEL ASSEMBLY SYSTEM

4207.1 Explain the function(s) of the MK 53 FUSE PANEL ASSEMBLY SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4207.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Explain the indication of the lighted indicator.
- C. List the position(s) and function(s) of each position of this component.
- D. Show or describe the actual physical location of this component.

.21	115V AC 400-Hz (nonregulated) indicator	A	B	C	D
.22	115V AC 400-Hz (regulated) indicator	X	X	X	X
.23	Attack dials switch	X	X	X	X
.24	Plotter switch	X		X	X
.25	Ballistic dials switch	X		X	X
.26	45V power supply monitor switch	X		X	X

4207.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4207.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4207.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4207.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Loss of 115V AC 400-Hz (regulated)
2. Loss of 115V AC 400-Hz (nonregulated)
3. Loss of 45V DC
4. Loss of 28V DC

B. There are no effect(s) due to the operation of this system to be discussed.

4207

4207.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4208 MK 53 DESK ASSEMBLY SYSTEM

4208.1 Explain the function(s) of the MK 53 DESK ASSEMBLY SYSTEM as stated in NAVSEA OP 2892, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4208.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. List the position(s) and function(s) of each position of this component.
- C. Show or describe the actual physical location of this component.

- .21 Desk assembly controls
- .22 Fuse mounting panel

A	B	C
X	X	X
X		X

4208.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4208.4 PRINCIPLES OF OPERATION

- A. There are no principles of operation in this system to be discussed.

4208.5 MAJOR PARAMETERS

- A. There are no major parameters in this system to be discussed.

4208.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:

1. Loss of 28V DC

- B. There are no effect(s) due to the operation of this system to be discussed.

4208.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.



4209 MK 199 LAUNCHER CAPTAIN CONTROL PANEL SYSTEM

4209.1 Explain the function(s) of the MK 199 LAUNCHER CAPTAIN CONTROL PANEL SYSTEM as stated in NAVSEA OP 2385, Vol. 1.

.11 Refer to a standard print of this system during the rest of this discussion.

4209.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show or describe the actual physical location of this component.
- C. Describe the mode(s) of control.
- D. Describe what each light indicates.

	A	B	C	D
.21 Launcher captain control panel cabinet	X	X	X	X
.22 Indicating lights	X	X	X	X
.23 Main power circuit breaker (3A2A6-CB1)	X	X	X	X
.24 Train motor start and stop switches (3A2A7-S1&10)	X	X	X	X
.25 3A2A7-DS7	X	X	X	X
.26 Elevation motor start and stop switches (3A2A7-S2 and S11)	X	X	X	X
.27 3A2A7-DS8	X	X	X	X
.28 Selection and lighting circuit supply switch (3A2A7-S8)	X	X	X	X
.29 Rectifier and relay transmitter supply switch (3A2A7-S4)	X	X	X	X
.210 Firing circuit firing supply switch (3A2A7-S5)	X	X	X	X
.211 Launcher control circuit supply switch (3A2A7-S6)	X	X	X	X
.212 Synchro local reference supply switch (3A2A7-S6)	X	X	X	X
.213 Firing circuit interlock supply switch (4A2A7-S8)	X	X	X	X
.214 Display lighting supply switch (3A2A7-S9)	X	X	X	X
.215 Train and elevation position and order indicators (3A2A1 Elevation/3A2A2 Train)	X	X	X	X
.216 Power drive selector switch (3A2-S1)	X	X	X	X
.217 Local train control (3A2-LC1)	X	X	X	X
.218 Local elevation control (3A2-LC2)	X	X	X	X
.219 Weapon status and firing condition display	X	X	X	X
.220 Clear launcher pushbutton switch (3A2-S10)	X	X	X	X
.221 Rail selector pushbutton switch (3A2-S11 thru S18)	X	X	X	X
.222 Rail and door control (3A2-S3)	X	X	X	X
.223 Latch and snubber control switch (3A2-S4)	X	X	X	X
.224 Guide mechanism switch (3A2-S2)	X	X	X	X
.225 Safety plug (3A2-S2)	X	X	X	X
.226 Firing selector switch (3A2-S7)	X	X	X	X

4209

4209.2 SYSTEM COMPONENTS - GENERAL (CONT'D)

	A	B	C	D
.227 Auxiliary firing detent switch (3A2-S8)	X	X	X	X
.228 Auxiliary firing switch (3A2-S9)	X	X	X	X
.229 Dummy director receptacles (3A2-J4 & J5)	X	X	X	X
.230 Test (3A2-J6) and safety plug stowage receptacles	X	X	X	X

4209.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4209.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4209.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4209.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Operation of the attack console

B. Describe the effect(s) on the following, due to the operation of this system:

1. All launcher systems

4209.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4210 MK 134 STABILIZATION COMPUTER SYSTEM

- 4210.1 Explain the function(s) of the MK 134 STABILIZATION COMPUTER SYSTEM as stated in NAVSEA OP 2892 and NAVSEA OD 13809.
- .11 Refer to a standard print of this system during the rest of this discussion.

4210.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show or describe the actual physical location of this component.
- C. List the position(s) and function(s) of each position of this component.

	A	B	C
.21 Relative bearing dial/knob	X	X	X
.22 Mount roll dial/knob	X	X	X
.23 Sonar train order dial/knob	X	X	X
.24 Depression angle dial/knob	X	X	X
.25 Mount pitch dial/knob	X	X	X
.26 Sonar depression dial/knob	X	X	X

4210.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4210.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 The input(s) from sonar equipment.
- .42 The input(s) from the MK 53 attack console.
- .43 The output(s) to sonar equipment.

4210.5 MAJOR PARAMETERS

- A. There are no major parameters in this system to be discussed.

4210.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
1. Loss of ship's electrical power
 2. Loss of sonar input(s)
 3. Loss of attack console input(s)

4210

4210.6 SYSTEM INTERRELATIONS (CONT'D)

B. There are no effect(s) due to the operation of this system to be discussed.

4210.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4211 MK 43 RELAY TRANSMITTER SYSTEM

4211.1 Explain the function(s) of the MK 43 RELAY TRANSMITTER SYSTEM as stated in NAVSEA OP 2697.

.11 Refer to a standard print of this system during the rest of this discussion.

4211.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Explain the procedure for reading the dial(s).
- C. Explain the indication of lighted indicator.
- D. List the position(s) and function(s) of each position of this component.
- E. Show or describe the actual physical location of this component.

- .21 Cutoff velocity dial
- .22 Time to separation dial
- .23 ISA test indicator
- .24 ISA not test indicator
- .25 Servo sync indicator
- .26 Servo not sync indicator
- .27 DC No. 1 normal indicator
- .28 DC No. 1 open indicator
- .29 Delay check indicator
- .210 Switchbox MK 12 normal test switch
- .211 Switchbox MK 12 test indicator

A	B	C	D	E
X	X			X
X	X			X
X		X		X
X		X		X
X		X		X
X		X		X
X		X		X
X		X		X
X		X		X
X			X	X
X	X			X

4211.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4211.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4211.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4211

4211.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 - 1. Loss of primary power
 - 2. Loss of illumination power
- B. There are no effect(s) due to the operation of this system to be discussed.

4211.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4212 MK 44 RELAY TRANSMITTER SYSTEM

4212.1 Explain the function(s) of the MK 44 RELAY TRANSMITTER SYSTEM as stated in NAVSEA OP 2698 and NAVSEA OD 13809.

- .11 Refer to a standard print of this system during the rest of this discussion.

4212.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Show or describe the actual physical location of this component.
 C. List the position(s) and function(s) of each position of this component.

	A	B	C
.21 Time to separation knob	X	X	X
.22 Designated missile elevation knob	X	X	X
.23 Effective range knob	X	X	X
.24 Designated missile range knob	X	X	X
.25 Relative bearing knob	X	X	X
.26 Designated true missile bearing knob	X	X	X

4212.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4212.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 The input(s) from the MK 53 attack console.
 .42 The input(s) from the Missile Fire Control System.
 .43 The input(s) from the Gunfire Control System.
 .44 The output(s) to the weapons direction equipment.
 .45 The output(s) to the Missile Fire Control System.
 .46 The output(s) to the Gunfire Control System.
 .47 The output(s) to the MK 53 attack console.
 .48 The only manual input to the MK 44 relay transmitter.

4212.5 MAJOR PARAMETERS

- A. There are no major parameters in this system to be discussed.

4212

4212.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Loss of ship's electrical power
2. Loss of MK 53 attack console inputs
3. Loss of missile fire control inputs
4. Loss of gunfire control inputs

B. There are no effect(s) due to the operation of this system to be discussed.

4212.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4213 MK 78 POSITION INDICATOR SYSTEM

4213.1 Explain the function(s) of the MK 78 POSITION INDICATOR SYSTEM as stated in NAVSEA OP 2696 and NAVSEA OD 13809.

.11 Refer to a standard print of this system during the rest of this discussion.

4213.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show or describe the actual physical location of this component.

.21	Dial groups	A B
.22	Switch panel	X X
		X X

4213.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part in terms of what it does for the component.
- B. Describe the physical location of this component part within the component.

.31	Dial groups:	A B
	a. Contact indicator	X X
	b. Target angle dial group	X X
	c. Target range counter	X X
	d. Missile bearing dial group	X X
	e. Missile range counter	X X
	f. Own ship dial group	X X

.32 Switch panel:

a.	Ready indicator	X X
b.	Torpedo selected indicator	X X
c.	Depth charge selected indicator	X X
d.	Torpedo approved indicator	X X
e.	Depth charge approved indicator	X X
f.	Weapon approval panel	X X
g.	Weapon approval switch	X X
h.	Illumination switch	X X
i.	Dimmer control	X X

4213

4213.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 The inputs into the system, what they are, and their origination.
- .42 The output, what it is, where it is originated, and what determines it.

4213.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4213.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

- 1. Loss of ship's electrical power
- 2. Loss of MK 53 attack console

B. There are no effect(s) due to the operation of this system to be discussed.

4213.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4214 MK 112 ASROC LAUNCHER SYSTEM

4214.1 Explain the function(s) of the MK 112 ASROC LAUNCHER SYSTEM as stated in NAVSEA OP 2385, Vol 1.

- .11 Refer to a standard print of this system during the rest of this discussion.

4214.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Show or describe the actual physical location of this component.
 C. Describe the source(s) of power.

	A	B	C
.21 Stand (MK 107 MOD 2)	X	X	X
.22 Carriage (MK 7 MOD 3)	X	X	X
.23 Train power drive (MK 61 MOD 3)	X	X	X
.24 Elevation power drive (MK 62 MOD 3)	X	X	X
.25 Training cover and seal	X	X	
.26 Guide (MK 7 MOD 1)	X	X	X

4214.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4214.4 PRINCIPLES OF OPERATION

- A. There are no principles of operation in this system to be discussed.

4214.5 MAJOR PARAMETERS

- A. There are no major parameters in this system to be discussed.

4214.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:

1. Loss of remote mode of operation to the launcher
2. Loss of normal firing power

- B. There are no effect(s) due to the operation of this system to be discussed.

4214.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4215 ASROC WEAPON SYSTEM

4215.1 Explain the function(s) of the ASROC WEAPON SYSTEM as stated in NAVSEA OP 2385, Vol. 1.

- .11 Refer to a standard print of this system during the rest of this discussion.

4215.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
 C. Show or describe the actual physical location of this component.
 D. Explain the component designation system.

	A	B	C	D
.21 Sonar console	X	X	X	
.22 Attack console	X	X	X	X
.23 Launcher captain control panel	X	X	X	X
.24 Relay transmitter	X	X	X	X
.25 Position indicator	X	X	X	X
.26 Launcher and missile simulator	X	X	X	X
.27 ASROC launcher	X	X	X	X
.28 Temperature alarm panel	X	X	X	X

4215.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4215.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 The transmission of target information developed by the Sonar and Fire Control System to the ASROC launcher.
 .42 Missile signals transmitted by the attack console to the selected missile through a relay transmitter.
 .43 Remote mode of operation.
 .44 Local mode of operation.
 .45 The purpose of the position indicator.

4215

4215.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4215.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Operation of Ship's Service Power Distribution System
2. Operation of Low-Pressure (Ship's Service) Air System
3. Operation of Ship's High-Pressure Air System
4. Operation of Remote Fire Control System
5. Operation of Ship's Firemain System

B. Describe the effect(s) on the following, due to the operation of this system:

1. Ship's Service Power Distribution System when inport

4215.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4216 MAGAZINE SPRINKLING (WET) SYSTEM

4216.1 Explain the function(s) of the MAGAZINE SPRINKLING (WET) SYSTEM as stated in NAVSEA OP 2665, Vol. 1 and NAVSEA 0348-078-1000.

.11 Refer to a standard print of this system during the rest of this discussion.

4216.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component.
- C. Show or describe the actual physical location of this component.
- D. List the protective device(s) for this component.

	A	B	C	D
.21 Saltwater supply line	X	X	X	X
.22 Sprinkling control valve	X	X	X	X
.23 Wet supply line	X	X	X	X
.24 Wet control line	X	X	X	X
.25 Saltwater control line	X	X	X	X
.26 PRP valve	X	X	X	X
.27 Heat sensing device	X	X	X	X
.28 Sprinkler heads	X	X	X	X
.29 Alarm switch	X	X	X	X
.210 Remote control valve	X	X	X	X
.211 Local control valve	X	X	X	X

4216.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4216.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4216.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4216.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

1. Firemain pressure

4216

4216.6 SYSTEM INTERRELATIONS (CONT'D)

B. Describe the effect(s) on the following, due to the operation of this system:

1. Firemain
2. Overboard discharge

4216.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4217 SH-2F HELICOPTER (LAMPS) SYSTEM

4217.1 Explain the function(s) of the SH-2F HELICOPTER (LAMPS) SYSTEM as stated in NAVAIR 01-260HCD-1, NWP-42, LAMPS Tactical Guidelines, and CCDP LTR ser. 31/543 of 26 Oct 73.

.11 Refer to above listed references during the rest of this discussion.

4217.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

A. Explain the function(s) of this component in terms of what it does for the system.

.21	LN66 radar	<u>A</u>
.22	ALR-54 passive ESM receiver	X
.23	Sonobuoy launcher	X
.24	AN/ARR-52 sonobuoy receiver	X
.25	AN/ASA-26 active sonobuoy processor	X
.26	AN/AKT-22 Data Link System	X
.27	R-1047A/A on top position indicator	X
.28	AN/ARA-25 DF receiver	X
.29	ASQ-81 MAD towed body	X
.210	RO-32 ASQ MAD recorder	X
.211	Smoke launcher	X
.212	AN/ARC-159 UHF transceivers (2)	X
.213	J28 UHF encoding equipment	X
.214	KY-28 signal delay unit	X
.215	AN/ARN-52 TACAN receiver	X
.216	AN/APX-72 IFF	X
.217	MK 44 and MK 46 torpedoes	X

4217.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4217.4 PRINCIPLES OF OPERATION

A. There are no principles of operation to be discussed.

4217.5 MAJOR PARAMETERS

- State the weapons/sonobuoy/smoke float loadout.
- State the ASW/ASMD radius of action.
- Discuss the rotor engagement/disengagement and launch/recovery.
- State the fuel endurance with and without weapons.
- State the maximum, on scene, and transit speeds.
- State the fuel purity requirements.

4217

4217.5 MAJOR PARAMETERS (CONT'D)

	A	B	C	D	E	F
.51 SH-2F helicopter	X	X	X	X	X	X
.52 Smoke launcher	X					
.53 Sonobuoy launcher	X					
.54 Torpedoes	X	X				
.55 Auxiliary fuel tanks				X		X

4217.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
1. Weather
 2. Line of sight
 3. Use of shipboard weapons systems
 4. Deck stabilization
- B. Describe the effect(s) on the following, due to the operation of this system:
1. Shipboard Weapons System

4217.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4218 MK 32 SURFACE VESSEL TORPEDO TUBES (SVTT) SYSTEM

4218.1 Explain the function(s) of the MK 32 SURFACE VESSEL TORPEDO TUBES (SVTT) SYSTEM as stated in NAVSEA OP 3369.

- .11 Refer to a standard print of this system during the rest of this discussion.

4218.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
 C. Show or describe the actual physical location of this component.
 D. Describe the weapon(s) this system is capable of firing.
 E. List or describe the source(s) of control signal(s).
 F. Describe the mode(s) of control.

- .21 Tube mount
 .22 Air flask
 .23 Remote/local firing switch
 .24 Ready switch
 .25 Air flask charging controls

A	B	C	D	E	F
X	X	X			X
X		X		X	
X	X	X		X	X
X	X	X			
X		X		X	

4218.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4218.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- A. How the weapon is launched.
 B. How the air flasks are charged.
 C. The procedures.

- .41 MK 32 SVTT
 .42 Extorp
 .43 Warshot

A	B	C
X	X	
		X
		X

4218.5 MAJOR PARAMETERS

- A. State the maximum and minimum range of the system with respect to the following weapons:

- .51 MK 44 torpedo
 .52 MK 46 torpedo

A
X
X

4218

4218.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 - 1. Loss of MK 53 attack console inputs
 - 2. Loss of ship's service air
- B. Describe the effect(s) on the following, due to the operation of this system:
 - 1. MK 53 Attack Console Ballistic Computer Firing Panel System

4218.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system:
 - 1. Working with high-pressure air

4219 T-MK-6 TORPEDO COUNTERMEASURES SYSTEM

4219.1 Explain the function(s) of the T-MK-6 TORPEDO COUNTERMEASURES SYSTEM as stated in NAVSEA 250-631-1 and NAVSEA 0967-490-1810.

.11 Refer to a standard print of this system during the rest of this discussion.

4219.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show or describe the actual physical location of this component.
- C. List or describe the source(s) of control signal(s).
- D. List or describe the mode(s) of operation.
- E. List the protection device(s) for this component.

		A	B	C	D	E
.21	Torpedo countermeasures noisemaker output controller	X	X		X	X
.22	Torpedo countermeasures winch	X	X		X	X
.23	Torpedo countermeasures noisemaker cable	X	X			
.24	Torpedo countermeasures noisemaker	X	X	X		

4219.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4219.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4219.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4219.6 SYSTEM INTERRELATIONS

- A. There are no effect(s) on this system to be discussed.
- B. Describe the effect(s) on the following, due to the operation of this system:
 1. AN/SQS-26 Sonar System
 2. AN/SQS-35 Sonar System
 3. Passive Acoustic System

2419.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system:
 1. Streaming torpedo C/M when operating with submarines

4220 MK 68 GUNFIRE CONTROL SYSTEM

4220.1 Explain the function(s) of the MK 68 GUNFIRE CONTROL SYSTEM as stated in NAVSEA OP 3836.

- .11 Draw a block diagram of this system from memory using appropriate symbols and showing all components listed in 4220.2 for use during the rest of this discussion.

4220.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
- C. Show the actual physical location of this component.
- D. Describe the source(s) of power.
- E. Describe the mode(s) of control.
- F. Describe the function of this component in relation to the fire control problem.

	A	B	C	D	E	F
.21 MK 68 gun director	X	X	X	X	X	X
.22 Fire control radar (AN/SPG-53 series)	X	X	X	X	X	X
.23 MK 47 computer	X	X	X	X	X	X
.24 MK 16 stable element	X	X	X	X		X
.25 Fire control switchboard	X	X	X	X		
.26 Dynamic tester	X	X	X	X		
.27 Error recorder	X	X	X	X		

4220.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4220.4 PRINCIPLES OF OPERATION

- A. There are no principles of operation in this system to be discussed.

4220.5 MAJOR PARAMETERS

- A. State the parameter(s).

.51 MK 68 gun director:

	<u>A</u>
a. Train	X
b. Elevation	X
c. Cross-level	X

4220

4220.5 MAJOR PARAMETERS (CONT'D)

A

.52 Fire control radar (AN/SPG-53 series):

- a. Range
- b. Frequency
- c. PRF
- d. Pulse width
- e. Power

X
X
X
X
X

.53 MK 47 computer:

- a. Computing range
- b. Advance range

X
X

.54 MK 16 stable element:

- a. Roll
- b. Pitch

X
X

4220.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

- 1. Wind
- 2. Ship's speed
- 3. Ship's course
- 4. Target motion
- 5. Roll and pitch
- 6. ASROC

B. Describe the effect(s) on the following, due to the operation of this system:

- 1. 5"/54 gun mount
- 2. Target designation
- 3. Basic Point Defense Surface Missile System
- 4. ASROC

4220.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4221 MK 68 GUN DIRECTOR SYSTEM

4221.1 Explain the function(s) of the MK 68 GUN DIRECTOR SYSTEM as stated in NAVSEA OP 3836 and NAVSEA OP 3480.

.11 Refer to a standard print of this system during the rest of this discussion.

4221.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Show the actual physical location of this component.
- C. Describe the mode(s) of operation.
- D. List the position(s) and function(s) of each position of this component.

	A	B	C	D
.21 Rangefinder	X	X		
.22 Binocular and open sight	X	X		
.23 Train warning switch	X	X		X
.24 Control panel MK 110	X	X	X	
.25 Target designation buzzer	X	X		X
.26 Precedence buzzer	X	X		
.27 Director Officer's one-man control	X	X		
.28 Gun director indicator MK 1	X	X		
.29 Firing key	X	X		X
.210 Director Officer's handwheels	X	X		X
.211 Indicator panel MK 310 (GFCS MK 68 MOD 13)	X	X		
.212 Indicator lamp panel (GFCS MK 68 MOD 11)	X	X		
.213 Auxiliary elevation handwheel	X	X		X
.214 Telescope MK 100	X	X		
.215 Tracker's one-man control	X	X		X
.216 Tracker's handwheel	X	X		X
.217 115-volt distribution box	X	X		
.218 440-volt switch and distribution box	X	X		
.219 Rangefinder operator's switch and jackbox	X	X		
.220 Illumination control	X	X		
.221 Independent elevation handwheel	X	X		
.222 Auxiliary train handwheel	X	X		X
.223 Train brake release	X	X		X
.224 Auxiliary cross-level handwheel	X	X		X
.225 Auxiliary cross-level lockpin	X	X		X
.226 Cross-level securing device	X	X		X
.227 Heater/defroster controls	X	X		X

4221.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part.
- B. Describe the physical location of this component part within the component.

A B

.31 Rangefinder:

- | | |
|-------------------------------------|-----|
| a. Range knob | X X |
| b. Ray filter and density knobs | X X |
| c. Interpupillary adjustment knob | X X |
| d. Correction knob | X X |
| e. Height adjust knob | X X |
| f. Internal adjuster shifting lever | X X |
| g. Internal range scale | X X |

.32 Control panel MK 110:

- | | |
|--|-----|
| a. Director power dirve ocntrol group | X X |
| b. Emergency run button | X X |
| c. Gunfire selector switch | X X |
| d. Normal handwheel selectror | X X |
| e. Cross-level synchronization controls | X X |
| f. Telephone selector switch | X X |
| g. Illumination control knob | X X |
| h. Computer indicator lamps | X X |
| i. Console indicator and button | X X |
| j. Target designation indicator and button | X X |

.33 Director Officer's one-man control:

- | | |
|------------------------------|-----|
| a. Left-hand trigger switch | X X |
| b. Right-hand trigger switch | X X |

.34 Gun director indicator MK 1:

- | | |
|-------------------------------|-----|
| a. Train designation dial | X X |
| b. Director train dial | X X |
| c. Own ship's control dial | X X |
| d. Director range dial | X X |
| e. Range designation dial | X X |
| f. Director elevation dial | X X |
| g. Elevation designation dial | X X |

.35 Telescope MK 100:

- | | |
|----------------------------------|-----|
| a. Interpupillary distance scale | X X |
| b. Headrest adjustment knob | X X |

4221.3 COMPONENT PARTS (CONT'D)

	A	B
c. Color filter knob	X	X
d. Headrest latch knob	X	X
e. Magnification selector lever	X	X
f. Diopter adjustment knob	X	X
g. Interpupillary knob	X	X

.36 Tracker's one-man control:

a. Left-hand grip switch	X	X
b. Left-hand trigger switch	X	X
c. Right-hand grip switch	X	X
d. Right-hand trigger switch	X	X

4221.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

.41 Why transmission checks are conducted.

4221.5 MAJOR PARAMETERS

A. State the parameter(s).

	A
.51 Train	X
.52 Elevation	X
.53 Cross-level	X

4221.6 SYSTEM INTERRELATIONS

A. There are no effect(s) on this system to be discussed.
 B. Describe the effect(s) on the following, due to the operation of this system:

1. Operation of MK 16 stable element
2. Operation of MK 47 computer
3. Operation of fire control radar (AN/SPG-53 series)
4. Operation of Target Designation System
5. Operation of 5"/54 gun mount

4221.7 SAFETY PRECAUTIONS

A. Discuss the following safety precautions unique to this system:

1. Use of train warning bell
2. While heaters on hatch coaming are on

4222 MK 47 COMPUTER SYSTEM

4222.1 Explain the function(s) of the MK 47 COMPUTER SYSTEM as stated in NAVSEA OP 3860 and NAVSEA OP 3836 or NAVSEA OP 3729.

.11 Refer to a standard print of this system during the rest of this discussion.

4222.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

A. Explain the function(s) of this component in terms of what it does for the system.

B. Show the actual physical location of this component.

C. Describe the mode(s) of operation.

D. List the position(s) and function(s) of each position of this component.

	A	B	C	D
.21 Test selector switches	X	X		
.22 Power control lamp indicators	X	X		
.23 DC voltmeters	X	X		
.24 24V DC indicator	X	X		
.25 Computer power switch	X	X	X	X
.26 Reduce charge mode switch	X	X	X	X
.27 Mode indicator lamp panel (Cover 54)	X	X	X	
.28 Scale control switch	X	X	X	X
.29 Height control switch	X	X	X	X
.210 Indirect fire switch	X	X	X	X
.211 Parallax switch	X	X	X	X
.212 Static test switch	X	X		X
.213 Time/track panel (Cover 51)	X	X		
.214 Fuse indicator	X	X		
.215 Test dials	X	X		
.216 Ship course dial handcrank	X	X		X
.217 Ship speed dial handcrank	X	X		X
.218 True wind group	X	X		X
.219 "j(Bd + Co)" dials	X	X		
.220 Gun train dial	X	X		
.221 Gun elevation dial	X	X		
.222 Ballistic group	X	X		
.223 Horizontal and height control group	X	X		X
.224 True target bearing dials	X	X		
.225 Spot dial group	X	X		
.226 Fuse dials and handcrank	X	X		X
.227 Sight deflection dials	X	X		
.228 Sight angle dials	X	X		
.229 Target speed and course dial group	X	X		
.230 Target elevation dials and handcrank	X	X		X

4222

4222.2 SYSTEM COMPONENTS - GENERAL (CONT'D)

	A	B	C	D
.231 Range counter and handcrank	X	X		X
.232 N-S range group	X	X		X
.233 E-W range group	X	X		X
.234 Director train dials and handcrank	X	X		X
.235 Level dials and handcrank	X	X		X
.236 "Bg5" dials	X	X		
.237 Target motion group	X	X		
.238 Target height dial group	X	X		X
.239 Cross-level dials and handcrank	X	X		X
.240 "Bgy" dials	X	X		
.241 "E4" dial	X	X		
.242 Time dials and handcrank	X	X		

4222.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4222.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

.41 Why transmission checks are conducted.

4222.5 MAJOR PARAMETERS

A. State the parameter(s).

.51 Computing range

.52 Advance range

A
X
X

4222.6 SYSTEM INTERRELATIONS

A. There are no effect(s) on this system to be discussed.

B. Describe the effect(s) on the following, due to the operation of this system:

1. 5"/54 gun mount
2. MK 68 gun director
3. Gunfire control radar
4. MK 16 stable element

4222.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4223 AN/SPG-53 SERIES GUNFIRE CONTROL RADAR SYSTEM

4223.1 Explain the function(s) of the AN/SPG-53 SERIES GUNFIRE CONTROL RADAR SYSTEM as stated in NAVSEA OP 3836 and NAVSEA OP 2782.

- .11 Refer to a standard print of this system during the rest of this discussion.

4223.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
 C. Show the actual physical location of this component.
 D. List the protective device(s) for this component.
 E. List the interlocks associated with this component.
 F. Describe the physical location of the sensing point(s) for the component.

	A	B	C	D	E	F
.21 Radar set control panel	X	X	X			
.22 Radar synchronizer panel	X	X	X			X
.23 Range indicator panel	X	X	X			
.24 Elevation indicator panel	X	X	X			
.25 Azimuth indicator panel	X	X	X			
.26 Trainer's ready foot switch	X	X	X			
.27 Range designation reject foot switch	X	X	X			
.28 Radar transmitter/receiver	X	X	X	X	X	X
.29 Radar signal processing equipment control unit	X		X			X
.210 Radar signal processing equipment cabinet	X		X	X	X	
.211 Low voltage power supplies	X	X	X	X	X	X
.212 High voltage power supplies	X	X	X	X	X	X
.213 Radar antenna and reflector	X	X	X			
.214 Ranger	X	X	X			X
.215 Target signal generator (if applicable)	X		X			
.216 Reg/nonreg switch	X		X			
.217 Manual/AGC	X		X			
.218 FTC/STC/IAGC	X		X			
.219 Manual/AFC/beacon	X		X			
.220 PRF	X		X			
.221 Magnetron tuning	X		X			
.222 RSPE mode selector	X		X			
.223 Search/designate	X		X			
.224 Range blanking	X		X			
.225 Elevation blanking	X		X			

4223.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4223

4223.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

A. How each position of the designated switch affects the system.

- .41 Manual/AGC
- .42 FTC/STC/IAGC
- .43 Manual/AFC/beacon
- .44 PRF
- .45 Magnetron tuning
- .46 RSPE mode selector
- .47 Search/designate
- .48 Range blanking
- .49 Elevation blanking

A
X
X
X
X
X
X
X
X

4223.5 MAJOR PARAMETERS

A. State the parameter(s).

- .51 Range
- .52 Frequency
- .53 PRF
- .54 Power

A
X
X
X
X

4223.6 SYSTEM INTERRELATIONS

A. Describe the effect(s) on this system due to the following:

- 1. Jamming
- 2. Coast zones

B. Describe the effect(s) on the following, due to the operation of this system:

- 1. MK 68 Gun Director System
- 2. MK 47 Computer System

4223.7 SAFETY PRECAUTIONS

A. Discuss the following safety precautions unique to this system:

- 1. RF radiation hazards

4224 MK 16 STABLE ELEMENT SYSTEM

4224.1 Explain the function(s) of the MK 16 STABLE ELEMENT SYSTEM as stated in NAVSEA OP 3836 and NAVSEA OP 2209.

.11 Refer to a standard print of this system during the rest of this discussion.

4224.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
- C. Show or describe the actual physical location of this component.
- D. Describe the source(s) of power.

- .21 Stable element
- .22 Stable element panel (MK 156)
- .23 Rate transmitter (MK 36)

A	B	C	D
X	X	X	
X	X	X	X
X	X	X	

4224.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part.
- B. Describe the physical location of this component part within the component.

.31 Stable element panel (MK 156):

- a. Gyro speed indicating panel
- b. Control switch
- c. Gyro temperature indicators
- d. Latitude knob
- e. Speed dial

A	B
X	X
X	X
X	X
X	X
X	X

4224.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4224.5 MAJOR PARAMETERS

.51 State the operating limits and settle time of the staple element.

4224

4224.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 - 1. Changes in ship's speed
 - 2. Changes in ship's course
 - 3. Changes in latitude
 - 4. Loss of power
- B. Describe the effect(s) on the following, due to the operation of this system:
 - 1. MK 47 computer
 - 2. MK 68 gun director
 - 3. Gunfire control radar

4224.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4225 MK 68 GUNFIRE CONTROL AUXILIARY EQUIPMENT SYSTEM

4225.1 Explain the function(s) of the MK 68 GUNFIRE CONTROL AUXILIARY EQUIPMENT SYSTEM as stated in NAVSEA OP 3836, Fire Control Technician G 3 & 2 and Ship's Information Books.

.11 Refer to the actual equipment of this system during the rest of this discussion.

4225.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

A. Explain the function(s) of this component in terms of what it does for the system.

B. Show or describe the actual physical location of this component.

	A	B
.21 Gunfire control switchboard	X	X
.22 MK 2 dynamic tester	X	X
.23 MK 7 error recorder	X	X
.24 MK 76 amplifier	X	X
.25 Cease fire alarms	X	X
.26 Salvo alarm	X	X
.27 Firing keys	X	X
.28 Spot converter	X	X
.29 Range tables	X	X
.210 Wind indicators	X	X
.211 Search programmer	X	X
.212 MK 5 indicating panel	X	X

4225.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

A. Explain the function(s) of this component part.

B. Describe the physical location of this component part within the component.

	A	B
.31 Gunfire control switchboard:		
a. Range select switch (Switch 1)	X	X
b. Stable element control switch (Switch 15)	X	X

4225.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 Why true wind has to be computed.
- .42 Why initial velocity has to be computed.

4225

4225.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4225.6 SYSTEM INTERRELATIONS

A. There are no system interrelations to be discussed.

4225.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4226 MK 68 GUNFIRE CONTROL COMMUNICATIONS SYSTEM

4226.1 Explain the function(s) of the MK 68 GUNFIRE CONTROL COMMUNICATIONS SYSTEM as stated in NAVSEA OP 3836 and Ship's Gunnery Doctrine.

.11 Refer to a standard print of this system during the rest of this discussion.

4226.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

A. Explain the function(s) of this component in terms of what it does for the system.

B. Show or describe the actual physical location of this component.

.21	JC circuit	A	B
.22	2JP circuit	X	X
.23	2I MC	X	X
.24	X6J circuit	X	X

4226.3 COMPONENT PARTS

A. There are no component parts in this system to be discussed.

4226.4 PRINCIPLES OF OPERATION

A. There are no principles of operation in this system to be discussed.

4226.5 MAJOR PARAMETERS

A. There are no major parameters in this system to be discussed.

4226.6 SYSTEM INTERRELATIONS

A. There are no system interrelations to be discussed.

4226.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4227 TARGET DESIGNATION SYSTEM

4227.1 Explain the function(s) of the TARGET DESIGNATION SYSTEM as stated in AN/SPA-50A, Vol. 1 (NAVSEA 0967-205-1010).

- .11 Draw a block diagram of this system from memory using appropriate symbols and showing all components listed in 4227.2 for use during the rest of this discussion.

4227.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
 B. Show or describe the actual physical location of this component.
 C. Describe the mode(s) of control.

	A	B	C
.21 AN/SPA-50 repeater	X	X	
.22 MK 7 bearing and range indicator	X	X	
.23 Foot switch	X	X	
.24 MK 68/UB selector switch	X	X	X
.25 MK 68/AN/SPA-50 - BPDSMS switch	X	X	X

4227.3 COMPONENT PARTS

- A. There are no component parts in this system to be discussed.

4227.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 How and where target designation output signals are utilized.

4227.5 MAJOR PARAMETERS

- A. There are no major parameters in this system to be discussed.

4227.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:

1. Nonfiring zones

4227

4227.6 SYSTEM INTERRELATIONS (CONT'D)

B. Describe the effect(s) on the following, due to the operation of this system:

1. MK 68 GFCS
2. MK 115 MFCS
3. Search radars
4. MK 114 UBFCs
5. Ship maneuvering

4227.7 SAFETY PRECAUTIONS

A. There are no safety precautions unique to this system.

4228 MK 115 FIRE CONTROL SYSTEM

4228.1 Explain the function(s) of the MK 115 FIRE CONTROL SYSTEM as stated in NAVSEA OP 3656 and 3467.

- .11 Draw a block diagram of this system from memory using appropriate symbols and showing all components listed in 4228.2 for use during the rest of this discussion.

4228.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
- C. Show or describe the actual physical location of this component.
- D. Describe the source(s) of power.
- E. List or describe the source(s) of TD signal(s).
- F. Describe the mode(s) of control.
- G. List or describe the mode(s) of operation.
- H. Describe the physical location of the sensing point(s) for the component.
- I. List the phone circuits used.

- .21 MK 285 fire control panel
 .22 MK 76 director illuminator
 .23 MK 67 target designation converter
 .24 MK 66 radar transmitter

A	B	C	D	E	F	G	H	I
X	X	X	X		X	X		X
X	X	X	X	X			X	X
X	X	X	X	X	X	X		X
X	X	X	X		X	X	X	X

4228.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part in terms of what it does for the component.
- B. Describe the functional location of this component part within the component.
- C. Describe the physical location of this component part within the component.
- D. Explain how this component part carries out its function.
- E. Describe the major material(s) used and explain why.
- F. List or describe the source(s) of power to this component part.

- .31 MK 76 director illuminator:

- a. Radar/receiver
- b. Optical sight
- c. Computer power supply

A B C D E F

X X X X X
 X X X X X X
 X X X X X

4228

4228.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- A. How and where signal is originated.
- B. How and where signal is utilized.
- C. Where power sources are located.
- D. Missile tuning cycles.
- E. Where power signal is indicated.
- F. How to light off and assign launcher.
- G. The process of lighting off the FCS.
- H. How and where control function is accomplished.
- I. How each position of the designated switches affects the system.
- J. The tracking procedure and operating characteristics.
- K. All meters/dials/switches and their functions.

		A	B	C	D	E	F	G	H	I	J	K
.41	MK 285 FCP				X	X	X	X	X			X
.42	MK 76 director illuminator									X		X
.43	MK 67 TDC	X	X	X					X			X
.44	Radar/receiver										X	
.45	Optical sight											X
.46	MK 66 radar transmitter	X	X	X		X		X	X	X		X

4228.5 MAJOR PARAMETERS

- A. State the parameter(s).

.51 MK 115 Fire Control System firing zones

$\frac{A}{X}$

4228.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 1. Simultaneous employment of 5"/54 guns at the same target
- B. There are no effect(s) due to the operation of this system to be discussed.

4228.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system:
 1. The radiation hazard existing when energized
 2. Launcher movement in remote assigned

4229 MK 25 MISSILE LAUNCHING SYSTEM

4229.1 Explain the function(s) of the MK 25 MISSILE LAUNCHING SYSTEM as stated in NAVSEA OP 3656 and NAVSEA OP 3973.

.11 Refer to a standard print of this system during the rest of this discussion.

4229.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
- C. Show or describe the actual physical location of this component.
- D. Describe the source(s) of power.
- E. List or describe the source(s) of control signal(s).
- F. Describe the mode(s) of control.
- G. List the protective device(s) for this component.
- H. List the interlocks associated with this component.
- I. Describe the "fail" position of the component on loss of control signal and the reason(s) it fails in this position.
- J. Describe the physical location of the sensing point(s) for the component.

- .21 MK 288 launcher control panel
 .22 MK 128 launcher
 .23 Missile (AIM 7E-2)

A	B	C	D	E	F	G	H	I	J
X	X	X	X					X	X
X	X	X	X	X	X	X	X	X	X
X	X	X	X	X			X		

4229.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part in terms of what it does for the component.
- B. Describe the functional location of this component part within the component.
- C. Describe the physical location of this component part within the component.
- D. Explain how this component part carries out its function.
- E. List or describe the source(s) of power to this component part.

- .31 MK 288 launcher control panel:

A B C D E

- a. Tuning drives

X X X X X

- .32 MK 128 launcher:

- a. MK 35 power drives

X X X X X

4229

4229.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- A. How and where the control signal is originated.
- B. How and where the drive signal is amplified.
- C. The interface between LCP and launcher.
- D. How and where the control function is accomplished.
- E. How each position of the designated switch affects the system.
- F. How the protective function(s) is accomplished.
- G. How the interlocking is accomplished.
- H. The function of all switches/indicators and dials.

		A	B	C	D	E	F	G	H
.41	MK 288 launcher control panel (LCP)			X		X		X	X
.42	MK 128 launcher	X	X	X	X		X	X	
.43	Missile (AIM 7E-2)	X			X		X		

4229.5 MAJOR PARAMETERS

- A. State the setpoint(s).
- B. State the reason(s) for the setpoint(s) in terms of the effect of operating above or below them.

		A	B
.51	MK 128 launcher firing zones	X	X
.52	Missile warm-up time	X	X
.53	Operating limits for target acquisition	X	

4229.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 - 1. Simultaneous employment of 5"/54 mount at same target
- B. There are no effect(s) due to the operation of this system to be discussed.

4229.7 SAFETY PRECAUTIONS

- A. Discuss the following safety precautions unique to this system:
 - 1. Launcher overspeed
 - 2. Launcher movement

4230 45-CALIBER PISTOL SYSTEM

4230.1 Explain the function(s) of the 45-CALIBER PISTOL SYSTEM as stated in FM 23-35.

- .11 Refer to a standard print of this system during the rest of this discussion.

4230.2 SYSTEM COMPONENTS - GENERAL

Discuss the designated items for each component listed below:

- A. Explain the function(s) of this component in terms of what it does for the system.
- B. Describe the functional location of this component with respect to its position in the system and the reason(s) for its location in this position.
- C. Show or describe the actual physical location of this component.

- .21 Slide group
 .22 Receiver group
 .23 Magazine group

A	B	C
X	X	X
X	X	X
X	X	X

4230.3 COMPONENT PARTS

Discuss the designated items for each component part listed below:

- A. Explain the function(s) of this component part in terms of what it does for the component.
- B. Describe the functional location of this component part within the component.
- C. Describe the physical location of this component part within the component.
- D. Explain how this component part carries out its function.

- .31 Receiver group:

- a. Slide stop
- b. Thumb safety
- c. Grip safety
- d. Hammer
- e. Trigger
- f. Magazine catch

A	B	C	D
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X
X	X	X	X

4230

4230.4 PRINCIPLES OF OPERATION

Demonstrate an understanding of the internal operation of this system by describing:

- .41 The firing cycle.
- .42 How loading and clearing is accomplished.
- .42 Mechanical safeties.

4230.5 MAJOR PARAMETERS

- .51 State the magazine capacity.
- .52 State the maximum effective range.

4230.6 SYSTEM INTERRELATIONS

- A. Describe the effect(s) on this system due to the following:
 - 1. Improper cleaning and maintenance
- B. There are no effect(s) due to the operation of this system to be discussed.

4230.7 SAFETY PRECAUTIONS

- A. There are no safety precautions unique to this system.

4301. WATCHSTATION - UNDERWATER BATTERY PLOT CONTROL INDICATOR OPERATOR4301.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Perform the steps of this procedure.

	<u>A</u>	<u>B</u>	<u>C</u>
.11 Select proper MK 53 primary inputs for range and bearing	X	X	X
.12 Select proper MK 53 secondary inputs for range and bearing	X	X	X
.13 Utilize proper AN/SQS-26 Channels 1 and 2 designation selections	X	X	X
.14 Utilize proper AN/SQS-35 designation selections	X	X	X

4301.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the visual indications.
- B. Describe the indicator light(s).

	<u>A</u>	<u>B</u>
.21 AN/SQS-26 Channel 1 information to MK 53 primary inputs	X	X
.22 AN/SQS-26 Channel 2 information to MK 53 primary inputs	X	X
.23 AN/SQS-35 information to MK 53 primary inputs	X	X
.24 GWCS MK 68 information to MK 53 primary inputs	X	X
.25 AN/SQS-26 Channel 1 information to MK 53 secondary inputs	X	X
.26 AN/SQS-26 Channel 2 information to MK 53 secondary inputs	X	X
.27 AN/SQS-35 information to MK 53 secondary inputs	X	X
.28 GWCS MK 68 information to MK 53 secondary inputs	X	X
.29 TDS information to MK 53 secondary inputs	X	X
.210 AN/SQS-26 Channel 1 contact information and designation control	X	X
.211 AN/SQS-26 Channel 2 contact information and designation control	X	X
.212 AN/SQS-35 contact information and designation control	X	X

4301

4301.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in/on Underwater Battery Control Indicator (UBCI).
- B. Indicate an understanding of the abnormal conditions by describing:

		<u>A</u>	<u>B</u>
.31	MK 114 UBWCS switchboard-ready and casualty lights not lit	X	X
.32	MK 53 primary source selector not matched with range and bearing selectors	X	X
.33	MK 53 secondary source selector not matched with range and bearing selectors	X	X

4301.4 EMERGENCIES and/or CASUALTIES.

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received on the Underwater Battery Control Indicator (UBCI).
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of corrective action provided.
- D. Indicate an understanding of the emergencies and/or casualties by describing:

- 1. Probable causes
- 2. Operating limitations imposed by this emergency and/or casualty
- 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
- 4. How these emergencies and/or casualties affect other watchstations

		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
.41	Loss of A/C power	X	X	X	X
.42	Pushbutton indicator failure to change illumination intensity	X	X	X	X

4301.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed

4302 WATCHSTATION - MK 53 ATTACK PLOTTER UNIT OPERATOR4302.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss notes associated with this procedure.
- D. Perform the steps of this procedure when practicable.

	A	B	C	D
.11 Make proper switch settings for attack operation	X	X	X	X
.12 Make proper switch settings for sonar contact operation	X	X	X	X
.13 Make proper switch settings for sonar lost contact operation	X	X	X	X
.14 Make proper switch settings for radar contact operation	X	X	X	X
.15 Make proper switch settings for tracking an ASROC missile	X	X	X	X
.16 Make proper switch settings for director control	X	X	X	X
.17 Make proper switch settings for position keeping	X	X	X	X

4302.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the indicator light(s).
- B. Describe the visual presentation of monitored units.

	A	B
.21 Sonar contact	X	X
.22 Radar contact	X	X
.23 Director control	X	X
.24 Position keeping	X	X
.25 Missile tracking	X	X
.26 Director assigned	X	X
.27 Functions not in automatic	X	
.28 Sonar not stablized	X	
.29 Attack overtemperature	X	
.210 Ballistic overtemperature	X	

4302.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

- A. There are no abnormal conditions that could lead to emergencies and/or casualties to be discussed.

4302.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in/on the Attack Plotter Unit.
- B. List or recite the steps of the procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.

- | | | | | | | |
|------|---|---|---|---|---|---|
| | | A | B | C | D | E |
| .41 | Loss of plotter mode selection | X | X | X | X | X |
| .42 | Loss of range and/or bearing inputs | X | X | X | X | X |
| .43 | Loss of range and/or bearing computations | X | X | X | X | X |
| .44 | Loss of plotter images | X | X | X | X | X |
| .45 | Loss of target course and/or speed control | X | X | X | X | X |
| .46 | Loss of depression angle | X | X | X | X | X |
| .47 | Loss of true bearing | X | X | X | X | X |
| .48 | Loss of own ship's speed and/or course inputs | X | X | X | X | X |
| .49 | Loss of position keep | X | X | X | X | X |
| .410 | Loss of plotter scale control | X | X | X | X | X |
| .411 | Loss of director control | X | X | X | X | X |
| .412 | Loss of wind inputs | X | X | X | X | X |
| .413 | Computer overtemperature | X | X | X | X | X |

4302.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4303 WATCHSTATION - MK 53 BALLISTIC COMPUTER UNIT OPERATOR4303.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss notes associated with this procedure.
- D. Perform the steps of this procedure when practicable.

		A	B	C	D
.11	Make proper switch settings for attack operation	X	X	X	X
.12	Make proper switch settings for sonar contact operation		X	X	X
.13	Make proper switch settings for radar contact operation		X	X	X
.14	Make proper switch settings for ASROC missile attack		X	X	X
.15	Make proper switch settings for prefiring check of ASROC missile		X	X	X
.16	Make proper switch settings for firing an ASROC missile		X	X	X
.17	Make proper switch settings for firing a second ASROC missile		X	X	X
.18	Make proper switch settings for a torpedo attack using a MK 32 SVTT		X	X	X
.19	Set up MK 32 SVTT for local firing		X	X	X
.110	Set up MK 32 SVTT for remote firing		X	X	X
.111	Check the charge of MK 32 SVTT air flasks with existing procedures		X	X	X

4303.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the indicator light(s).
- B. Describe the visual presentation of monitored units.

		A	B
.21	Cutoff velocity		X
.22	Time to separation		X
.23	Launcher elevation order		X
.24	Observed launcher elevation order		X
.25	Launcher train order		X
.26	Observed launcher train order		X
.27	Torpedo ident switch	X	
.28	Tube selector switch	X	

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4303.2 NORMAL OPERATIONS (CONT'D)

	A	B
.29 Weapons selector display	X	
.210 System operation selector	X	
.211 Bridge signal display	X	
.212 Launcher status	X	X
.213 Missile selection pushbuttons	X	X
.214 Clear pushbuttons	X	X
.215 Depth set switches	X	
.216 Weapons status display	X	X
.217 System firing key	X	X

4303.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received on the MK 32 MOD 9 SVTT/MK 53 Ballistic Computer Firing Panel.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 1. Operating limitations imposed by the abnormal conditions
 2. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 3. How these abnormal conditions affect other watchstations

	A	B	C
.31 Loss of air pressure from MK 32 SVTT air flasks	X	X	X

4303.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the communications that must be established and/or utilized.
- D. Describe the limitations imposed by the use of this emergency and/or casualty operation.
- E. Perform this emergency and/or casualty corrective action when practicable.

	A	B	C	D	E
.41 Loss of torpedo tube selection	X	X	X	X	X
.42 Loss of wind computations	X	X	X	X	X
.43 Loss of cutoff velocity and/or time to separation	X	X	X	X	X
.44 Loss of launcher train order	X	X	X	X	X
.45 Loss of launcher elevation order	X	X	X	X	X

4303.4 EMERGENCIES and/or CASUALTIES (CONT'D)

	A	B	C	D	E
.46 Loss of permission to fire	X	X	X	X	X
.47 Loss of weapon selection	X	X	X	X	X
.48 Loss of firing power	X	X	X	X	X
.49 Loss of launcher stabilization	X	X	X	X	X
.410 Loss of cell selection	X	X	X	X	X
.411 Computer overtemperature	X	X	X	X	X

4303.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operations listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the parameter indication(s) that must be monitored.
- E. Discuss the safety precautions that must be observed.
- F. Describe the condition(s) that require this infrequent and/or abnormal operation.
- G. Define how the parameter(s) monitored by this watchstation are changed during this infrequent and/or abnormal operation.
- H. Perform this infrequent and/or abnormal operation when practicable.

	A	B	C	D	E	F	G	H
.51 Charging of MK 32 SVTT air flasks	X	X	X	X	X	X	X	X

4304 WATCHSTATION - MK 199 LAUNCHER CAPTAIN CONTROL PANEL OPERATOR4304.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Identify all the indicator lights that will be on.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

	A	B	C	D	E	F	G
.11 Conduct pre-operational check	X	X			X		X
.12 Accomplish activating procedures	X	X	X	X	X	X	X
.13 Place launcher in remote control	X	X	X	X	X	X	X
.14 Hold transmission checks	X	X	X	X	X	X	X
.15 Complete deactivation procedures	X	X	X	X	X	X	X

4304.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Identify the indicator lights that will be on.
- B. Describe the switch positions.

	A	B
.21 Power available	X	
.22 Starting the launcher	X	
.23 Operating in local mode		X
.24 Launcher train		X
.25 Launcher elevation		X
.26 Launcher entering unsafe zone	X	
.27 Operating in remote mode		X
.28 Selecting telephone circuits	X	X
.29 Manual operations	X	X

4304.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received on the Launcher Captain Control Panel.
- B. List or recite the steps of the corrective action required.

4304.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

C. Indicate an understanding of the abnormal conditions by describing:

1. Probable causes
2. Operating limitations imposed by the abnormal conditions
3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
4. How these abnormal conditions affect other watchstations

	A	B	C
.31 No pressure in elevation stow latch and guide drive pin system or sudden drop in pressure	X	X	X
.32 Low or fluctuating pressure, system noisy, slow or jerky movements of working parts	X	X	X
.33 Improper light indications at control panels	X	X	X
.34 DS-12 clogged filter indicator illuminates	X	X	X
.35 DS-12 clogged filter indicator inoperative	X	X	X
.36 Insufficient buffer action	X	X	X
.37 Buffers slow in returning to neutral position	X	X	X
.38 Buffer freezes in any one position	X	X	X
.39 Restraining latch in pneumatic-hydraulic system seized or binding in any position	X	X	X
.310 Bottom snubbers retracting or extending prior to side snubbers	X	X	X
.311 Side snubbers slamming to retracted position	X	X	X
.312 Side snubbers or launching rail seizing or binding in any position	X	X	X
.313 Launching rail slamming to retracted position	X	X	X
.314 Power drive motor fails to start	X	X	X
.315 Power drive motor starts but fails to hold when switch is released to run	X	X	X
.316 No selection in selection circuits - both motors, all pushbuttons	X	X	X
.317 No selection - both motors, one pushbutton	X	X	X
.318 No selection - one motor	X	X	X
.319 Improper selection	X	X	X
.320 Improper selection - pushbutton net	X	X	X
.321 Improper selection - selection net	X	X	X
.322 Switch fails to stop motorizing	X	X	X
.323 Guide drive pin solenoid control circuit selected pin will not extend	X	X	X
.324 Engaged pin will not retract	X	X	X
.325 Torque tube fails to respond to elevation order	X	X	X
.326 Guide mechanism control circuit rail does not extend on standby order		X	X
.327 Rail extends but snubbers fail to retract	X	X	X
.328 Rail does not retract when firing switch is returned to "off"	X	X	X

4304.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

	<u>A</u>	<u>B</u>	<u>C</u>
.329 Train and elevation servo system power drive will not respond to computer's order	X	X	X
.330 Order or launcher position does not appear at 3A2A2 mode (3A2A8 torque receiver)	X	X	X
.331 Launcher fails to respond to local control	X	X	X
.332 Guide will not return to "stow"	X	X	X
.333 Power drive will not respond to order	X	X	X
.334 Missile control and indicating light circuits launcher sync indications fail to transfer	X	X	X
.335 Firing-power-off indication remains after 3A2A7-S5 is turned on	X	X	X
.336 Firing-obstructed/sector-clear indication fails to transfer when selected guide is in a safe firing zone	X	X	X
.337 Missile-not-ready/missile-ready indication fails to transfer depth charge in cell	X	X	X
.338 Missile-not-ready/missile-ready indication fails to transfer torpedo in cell	X	X	X
.339 Launcher fails to respond to LC1 or LC2	X	X	X
.340 Firing circuit standby light fails to come on when standby order is passed and no action occurs in the selected cell	X	X	X
.341 Standby light illuminates but no action occurs at selected cell		X	X
.342 Ready-to-fire light does not illuminate after rail extends and snubbers retract		X	X
.343 Missile fails to fire after firing orders are passed and 25 seconds later the dud light illuminates		X	X
.344 Low temperature sensing device	X	X	X
.345 High temperature sensing device	X	X	X
.346 Low-pressure	X	X	X
.347 High-pressure	X	X	X
.348 Main power circuit breaker (3A2A6-CB1) jumps from "on" to "tripped"		X	X
.349 Lamps illuminated on train filter (3A2A7-DS10), elevation filter (3A2A7-DS11) and/or accumulator filter (3A2A7-DS12)		X	X

4304.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in the Launcher Control Station.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.

4304.4 EMERGENCIES and/or CASUALTIES (CONT'D)

- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

		A	B	C	D	E	F
.41	Snubbers and latch do not retract when latch and snubber switch (3A2-S4) is moved to "release"	X	X	X	X		X
.42	Missile does not fire when firing switch (3A2-S9 or 4A4-S10) is moved from "standby" to "fire"; and dud window does not illuminate	X	X	X	X	X	X
.43	Dud window illuminates after attempted firing		X	X	X	X	X
.44	Missile-not-ready window (3A2-DS101 and 102) illuminates during attack			X	X	X	X
.45	Fire control is unable to select rail or missile	X	X	X	X	X	X
.46	Missile-not-latched light (3A2-DS135) illuminates		X	X	X	X	X
.47	Guide does not respond to position orders	X	X	X	X	X	X
.48	Rail does not extend when firing switch (4A4-S10) or auxiliary firing switch (3A2-S9) is switched to "standby"		X	X	X	X	X
.49	Ready-to-fire indicator not received at ASW control room			X	X	X	X
.410	Missile fires while in launcher	X	X	X	X	X	X

4304.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed

4305 WATCHSTATION - MK 43 RELAY TRANSMITTER OPERATOR4305.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Perform the steps of this procedure when practicable.

.11 Make proper switch setting on switchbox (MK 12) A B C
X X X

4305.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the indicator light(s).
- B. Describe the visual presentation of monitored units.

	A	B
.21 Cutoff velocity	X	X
.22 Time to separation	X	X
.23 ISA test	X	X
.24 ISA not test	X	X
.25 Servo sync	X	X
.26 Servo not sync	X	X
.27 DC No. 1 normal	X	X
.28 DC No. 1 open	X	X
.29 Delay check	X	X
.210 Switchbox (MK 12) test	X	X

4305.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

- A. There are no abnormal conditions that could lead to emergencies and/or casualties to be discussed.

4305.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in/on the Relay Transmitter.
- B. List or recite the steps of the procedure for the immediate action portion of this emergency and/or casualty.

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4305.4 EMERGENCIES and/or CASUALTIES (CONT'D)

- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Perform the emergency and/or casualty procedure when practicable.

- .41 Loss of system power
.42 Loss of cutoff velocity input
.43 Loss of time to separation input
.44 Loss of illumination

A	B	C	D	E
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

4305.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the steps of this procedure.
B. Explain the reasons for each step of this procedure.
C. Discuss the communications that must be established and/or utilized.
D. Describe the limitation(s) imposed by the use of this infrequent and/or abnormal operation.
E. Perform this infrequent and/or abnormal operation when practicable.

- .51 Loss of cutoff velocity input
.52 Loss of time to separation input

A	B	C	D	E
X	X	X	X	X
X	X	X	X	X

4306 WATCHSTATION - T-MK-6 TORPEDO COUNTERMEASURES OPERATOR4306.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.
- H. Perform the steps of this procedure when practicable.

	A	B	C	D	E	F	G	H
.11 Energize torpedo countermeasures winch	X	X	X			X	X	
.12 Energize torpedo countermeasures noisemakers	X	X	X	X	X	X	X	
.13 Secure torpedo countermeasures noisemakers	X	X	X	X	X	X	X	
.14 Secure torpedo countermeasures winch	X	X	X			X	X	
.15 Stream torpedo countermeasures noisemakers IAW current doctrine								
.16 Operate torpedo countermeasures winch from local position	X	X	X	X	X	X		X
.17 Operate torpedo countermeasures winch from remote position	X	X	X			X		X
	X	X	X			X		X

4306.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the switch/lever positions.

	A
.21 Selection of proper drum assembly electrically	X
.22 Selection of proper drum assembly mechanically	X

4306.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in/on Torpedo Countermeasures Control Panel.
- B. List or recite the steps of the corrective action required.

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4306.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

C. Indicate an understanding of the abnormal conditions by describing:

1. Operating limitations imposed by the abnormal conditions
2. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected

A B C
X X X

.31 Overvoltage/current readings

4306.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received on the torpedo countermeasures winch.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:

1. Corrective action provided
2. Protection provided

D. Indicate an understanding of the emergencies and/or casualties by describing:

1. Operating limitations imposed by this emergency and/or casualty
2. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
3. How these emergencies and/or casualties affect other watchstations

- .41 Loss of 440V AC 3-phase 60-Hz
- .42 Loss of drum motor
- .43 Loss of drum brake
- .44 Loss of noisemaker

A B C D
X X X X
X X X X
X X X X
X X X X

4306.5 INFREQUENT and/or ABNORMAL OPERATIONS

A. There are no infrequent and/or abnormal operations to be discussed

4307 WATCHSTATION - MAGAZINE SPRINKLER (WET) SYSTEM OPERATOR4307.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the communications that must be observed.
- F. Perform the steps of this procedure.

- .11 Conduct step operation
- .12 Conduct automatic operations
- .13 Conduct test

A	B	C	D	E	F
X	X	X	X		
X	X	X	X		
X	X	X	X	X	

4307.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the indicator light(s).

- .21 Alarm panel

A
X

4307.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in/on the Magazine Sprinkler System.
- B. Discuss the procedures to be followed.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions
 - 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 - 4. How these abnormal conditions affect other watchstations

- .31 High temperatures

A	B	C
X	X	X

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4307.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in/on the Magazine Sprinkler System.
- B. Discuss the procedures to be followed.
- C. Indicate an understanding of the emergencies and/or casualties by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by this emergency and/or casualty
 - 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 - 4. How these emergencies and/or casualties affect other watchstations
- D. Perform the emergency and/or casualty procedure when practicable.

.41 Fire

A	B	C	D
X	X	X	X

4307.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4308 WATCHSTATION - FLIGHT DECK SAFETY OFFICER4308.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the safety precautions that must be observed.
- F. Perform the steps of this procedure.

	A	B	C	D	E	F
.11 Conduct helo start/stop operations	X	X	X	X	X	X
.12 Brief/instruct passengers	X	X				X
.13 Ensure that proper cargo handling equipment is utilized	X	X	X		X	X
.14 Enforce safety regulations	X	X	X	X		X

4308.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.

	A	B
.21 Helicopter launch	X	X
.22 Helicopter recovery	X	X
.23 Helicopter in-flight refueling	X	X
.24 Hot refueling	X	X
.25 Static refueling	X	X

4308.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received by the Flight Deck Safety Officer.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions

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4308.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
4. How these abnormal conditions affect other watchstations

	A	B	C
.31 High sea state	X		X
.32 Low visibility	X		X
.33 Poor wind conditions	X	X	X
.34 Shipboard emergencies	X	X	X
.35 Hung MAD towed body	X	X	X
.36 Failure of one engine	X	X	X
.37 Hung droop stops	X	X	X

4308.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received by the Flight Deck Safety Officer.
- B. List or recite the steps of the procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Perform the emergency and/or casualty procedure when practicable.

4308.4 EMERGENCIES and/or CASUALTIES (CONT'D)

	A	B	C	D	E
.41 Equipment casualty	X	X	X	X	
.42 Sea state/wind conditions	X		X		
.43 Visibility	X		X		
.44 Shipboard emergency	X	X	X	X	X
.45 Helicopter casualty	X	X	X	X	

4308.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the action to be taken.
- B. Discuss the communications that must be established and/or utilized.
- C. Discuss the safety precautions that must be observed.

	A	B	C
.51 Recover hung MAD towed body	X	X	X
.52 Hover with one engine	X	X	X
.53 Secure rotors with hung droop stops	X	X	X
.54 Operations conducted during low visibility condition	X	X	X
.55 Operations conducted during high wind conditions	X	X	X
.56 Operations conducted during high sea state	X	X	X

4309 WATCHSTATION - HELICOPTER DIRECTOR LSE/LSO4309.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the safety precautions that must be observed.
- F. Perform the steps of this procedure.

	A	B	C	D	E	F
.11 Inventory flight deck equipment	X	X				X
.12 Demonstrate knowledge of control signals (day/night)	X	X	X	X	X	X
.13 Conduct pre-operational flight deck checkout	X	X	X			X
.14 Enforce safety regulations	X	X				X
.15 Helo start/stop operations	X	X	X	X	X	X

4309.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.

	A	B
.21 Helicopter launch	X	X
.22 Helicopter recovery	X	X
.23 Helicopter in-flight refueling	X	X
.24 Hot refueling	X	X
.25 Static refueling	X	X

4309.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received by the Helicopter Director LSE/LSO.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions

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4309.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
4. How these abnormal conditions affect other watchstations

	A	B	C
.31 High sea state	X		X
.32 Low visibility	X		X
.33 Shipboard emergency	X	X	X
.34 Hung MAD towed body	X	X	X
.35 Failure of one engine	X	X	X
.36 Hung droop stops	X	X	X
.37 Poor wind conditions	X	X	X
.38 Aircraft fire with ordnance aboard	X	X	X

4309.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received by the Helicopter Director LSE/LSO.
- B. List or recite the steps of the procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Perform the emergency and/or casualty procedure when practicable.

4309.4 EMERGENCIES and/or CASUALTIES (CONT'D)

	A	B	C	D	E
.41 Equipment casualty	X	X	X	X	
.42 Sea state/wind conditions	X		X		
.43 Visibility	X		X		
.44 Shipboard emergency	X	X	X	X	X
.45 Helicopter casualty	X	X	X	X	X

4309.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the action to be taken.
- B. Discuss the communications that must be established and/or utilized.
- C. Discuss the safety precautions that must be observed.

	A	B	C
.51 Recover hung MAD towed body	X	X	X
.52 Hover with one engine	X	X	X
.53 Secure rotors with hung droop stops	X	X	X
.54 Operations conducted during low visibility condition	X	X	X
.55 Operations conducted during poor wind conditions	X	X	X
.56 Operations conducted during high sea state	X	X	X

4310 WATCHSTATION - MK 68 DIRECTOR OFFICER4310.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

	A	B	C	D	E	F	G
.11 Cast loose director	X	X	X	X	X	X	X
.12 Operate director	X	X	X	X	X	X	X
.13 Secure director	X	X	X	X	X	X	X
.14 Conduct AA tracking	X	X	X	X	X	X	X
.15 Conduct surface tracking	X	X	X	X	X	X	X

4310.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the indicator light(s).

	A	B	C	D
.21 Operating director	X	X	X	X
.22 Conducting shore bombardment	X	X		X
.23 Conducting AA firing	X	X		X
.24 Conducting surface firing	X	X		X
.25 Spotting fall of shot	X	X		

4310.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in MK 68 Director.
- B. List or recite the steps of the corrective action required.

4310

4310.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

- C. Indicate an understanding of the abnormal conditions by describing:
1. Probable causes
 2. Operating limitations imposed by the abnormal conditions
 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 4. How these abnormal conditions affect other watchstations

.31 Hangfire

A	B	C
X	X	X

4310.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in the MK 68 Director.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

- .41 Loss of power
- .42 Loss of stabilization
- .43 Misfire

A	B	C	D	E	F
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	X

4310.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed

4311 WATCHSTATION - MK 68 DIRECTOR TRACKER4311.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

- .11 Cast loose director
- .12 Operate director in optical mode
- .13 Operate director in console mode
- .14 Operate director in target designation mode
- .15 Operate director in auto track
- .16 Operate director in handwheel mode
- .17 Secure director
- .18 Conduct AA tracking
- .19 Conduct surface tracking

A	B	C	D	E	F	G
X	X	X		X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X
X	X	X		X	X	X
X	X	X	X	X	X	X
X	X	X	X	X	X	X

4311.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Describe the indicator light(s).

- .21 Casting loose
- .22 Optical mode
- .23 Console mode
- .24 Target designation mode
- .25 Radar automatic tracking mode
- .26 Handwheel mode
- .27 Securing

A
X
X
X
X
X
X
X

4311.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received on MK 68 Gun Director.
- B. List or recite the steps of the corrective action required.

4311

4311.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES (CONT'D)

C. Indicate an understanding of the abnormal conditions by describing:

1. Probable causes
2. Operating limitations imposed by the abnormal conditions
3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
4. How these abnormal conditions affect other watchstations

- .31 Misfire
.32 Hangfire

A	B	C
X	X	X
X	X	X

4311.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in the MK 68 Gun Director.
- B. List the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

- .41 Loss of power
.42 Loss of firing circuits
.43 Loss of communications

A	B	C	D	E	F
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	X

4311.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4312 WATCHSTATION - MK 68 RANGEFINDER OPERATOR4312.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

	A	B	C	D	E	F	G
.11 Cast loose rangefinder	X	X	X	X	X	X	X
.12 Operate rangefinder	X	X	X	X	X	X	X
.13 Secure rangefinder	X	X	X	X	X	X	X
.14 Conduct counterbattery	X	X	X	X	X	X	X

4312.2 NORMAL OPERATIONS

- A. There are no normal operations to be discussed.

4312.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

- A. There are no abnormal conditions that could lead to emergencies and/or casualties to be discussed.

4312.4 EMERGENCIES and/or CASUALTIES

- A. There are no emergencies and/or casualties to be discussed.

4312.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the steps of this procedure
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the parameter indication(s) that must be monitored.
- E. Discuss the safety precautions that must be observed.
- F. Describe the limitation(s) imposed by the use of this infrequent and/or abnormal operation.

	A	B	C	D	E	F
.51 Loss of gas	X	X	X	X	X	X

4313 WATCHSTATION - AN/SPG-53 SERIES RADAR OPERATOR4313.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

	A	B	C	D	E	F	G
.11 Cast loose radar	X	X	X		X	X	X
.12 Accept, acquire and track a designated target	X	X	X	X	X	X	X
.13 Acquire and track target manually	X	X	X	X	X	X	
.14 Operate antijam controls	X	X	X		X	X	X
.15 Operate coast control	X	X	X		X	X	X
.16 Set up for beacon operation	X	X	X	X	X	X	X
.17 Set up for radar operation using RSPE	X	X	X	X	X	X	X
.18 Secure radar	X	X	X		X	X	X

4313.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the indicator light(s).

	A	B	C	D
.21 Filaments	X	X	X	X
.22 Standby	X	X	X	X
.23 Radiate	X	X	X	X
.24 Target designation mode	X	X	X	X
.25 Automatic track	X	X	X	X
.26 Beacon	X	X	X	X
.27 RSPE	X	X	X	X

4313.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in/on Gunfire Control Radar (AN/SPG-53 series).
- B. List or recite the steps of the corrective action required.

4313

4313.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

- C. Indicate an understanding of the abnormal conditions by describing:
1. Probable causes
 2. Operating limitations imposed by the abnormal conditions
 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 4. How these abnormal conditions affect other watchstations

.31	Range hops	A	B	C
.32	Magnetron arcing	X	X	X
.33	Power supply variations	X	X	X
.34	Range drift	X	X	X

4313.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in/on the Gun Fire Control Radar (AN/SPG-53 series).
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

4313.4 EMERGENCIES and/or CASUALTIES (CONT'D)

	A	B	C	D	E	F
.41 Loss of power	X	X	X	X	X	X
.42 Loss of AFC	X	X	X	X	X	X
.43 Loss of AGC	X	X	X	X	X	X
.44 Target designation failure	X	X	X	X	X	X
.45 Loss of range scope presentation	X	X	X	X	X	X
.46 Loss of "E" scope presentation	X	X	X	X	X	X
.47 Loss of "B" scope presentation	X	X	X	X	X	X

4313.5 INFREQUENT and/or ABNORMAL OPERATIONS

A. There are no infrequent and/or abnormal operations to be discussed.

4314 WATCHSTATION - MK 47 COMPUTER OPERATOR4314.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure.

	A	B	C	D	E	F	G
.11 Cast loose computer	X	X	X	X	X		X
.12 Set up for automatic rate control (air)	X		X	X	X	X	X
.13 Set up for automatic rate control (surface)	X		X	X	X	X	X
.14 Set up for manual rate control (surface)	X		X	X	X	X	X
.15 Set up for optical range control (surface)	X		X	X	X	X	X
.16 Set up for local control, indirect fire (surface)	X		X	X	X	X	X
.17 Set up for automatic rate control (shore bombardment)	X		X	X	X	X	X
.18 Set up for manual rate control (shore bombardment)	X		X	X	X	X	X
.19 Set up for optical range control (shore bombardment)	X		X	X	X	X	X
.110 Set up for local control, indirect fire (shore bombardment)	X		X	X	X	X	X
.111 Set up for offset point of aim (shore bombardment)	X		X	X	X	X	X
.112 Set up for service charge (starshell projectile, if applicable)	X		X	X	X	X	X
.113 Set up for reduced charge (starshell projectile, if applicable)	X		X	X	X	X	X
.114 Set up for reduced charge (common projectile, if applicable)	X		X	X	X	X	X
.115 Secure computer	X	X	X	X	X	X	X
.116 Conduct transmission checks	X	X	X	X	X	X	X
.117 Conduct "A" test	X				X		X
.118 Conduct dynamic test	X		X	X	X		X
.119 Compute initial velocity	X	X					X

4314

4314.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the dial reading(s).
- E. Describe the indicator light(s).

	A	B	C	D	E
.21 Casting loose	X	X	X	X	X
.22 Automatic rate control (air)	X	X	X	X	X
.23 Automatic rate control (surface)	X	X	X	X	X
.24 Manual rate control (surface)	X	X	X	X	X
.25 Optical range control (surface)	X	X	X	X	X
.26 Local control, indirect fire (surface)	X	X	X	X	X
.27 Automatic rate control (shore bombardment)	X	X	X	X	X
.28 Manual rate control (shore bombardment)	X	X	X	X	X
.29 Optical range control (shore bombardment)	X	X	X	X	X
.210 Local control, indirect fire (shore bombardment)	X	X	X	X	X
.211 Offset point of aim (shore bombardment)	X	X	X	X	X
.212 Service charge (starshell projectile)	X	X	X	X	X
.213 Reduced charge (starshell projectile)	X	X	X	X	X
.214 Reduced charge (common projectile)	X	X	X	X	X
.215 Securing	X	X	X	X	X
.216 Transmission checks	X	X	X	X	X
.217 "A" test	X	X	X	X	X
.218 Dynamic test	X	X	X	X	X

4314.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received on the MK 47 Computer.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions
 - 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 - 4. How these abnormal conditions affect other watchstations

	A	B	C
.31 Overheated light energized	X	X	X
.32 Operator error	X	X	X

4314.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received on the MK 47 Computer.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 1. Corrective action provided
 2. Protection provided
 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 1. Probable causes
 2. Operating limitations imposed by this emergency and/or casualty
 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

	A	B	C	D	E	F
.41 Loss of electrical power	X	X	X	X	X	X
.42 Loss of ship's course input	X	X	X	X	X	X
.43 Loss of ship's speed input	X	X	X	X	X	X
.44 Loss of stabilization	X	X	X	X	X	X
.45 Loss of range input	X	X	X	X	X	X
.46 Loss of bearing input	X	X	X	X	X	X
.47 Loss of elevation input	X	X	X	X	X	X

4314.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4315 WATCHSTATION - MK 16 STABLE ELEMENT OPERATOR4315.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the parameter indication(s) that must be monitored.
- E. Discuss the safety precautions that must be observed.
- F. Perform the steps of this procedure.

- .11 Cast loose stable element
- .12 Operate stable element
- .13 Secure stable element

A	B	C	D	E	F
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	X

4315.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the indicator light(s).

- .21 Casting loose
- .22 Operating stable element
- .23 Securing and standby

A	B	C	D
X	X	X	X
X	X	X	X
X	X	X	X

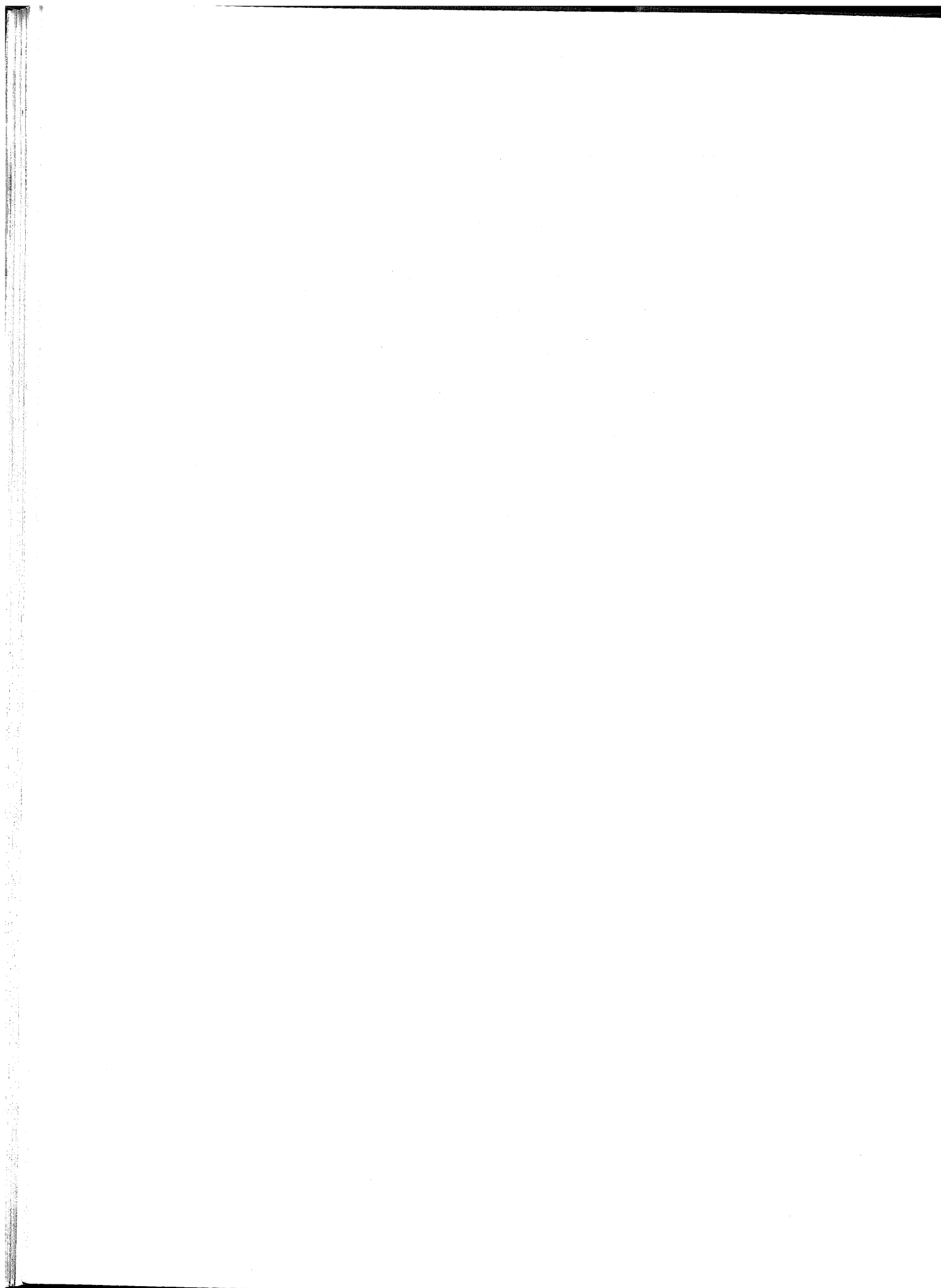
4315.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in the MK 16 Stable Element.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 1. Probable causes
 2. Operating limitations imposed by the abnormal conditions
 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 4. How these abnormal conditions affect other watchstations

- .31 Temperature lights energized

A	B	C
X	X	X



4315

4315.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received in the Gun Plot.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
 - 1. Corrective action provided
 - 2. Protection provided
 - 3. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by this emergency and/or casualty
 - 3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
 - 4. How these emergencies and/or casualties affect other watchstations
- E. Outline the followup action required.
- F. Perform the emergency and/or casualty procedure when practicable.

		A	B	C	D	E	F
.41	Loss of 400-Hz power	X	X	X	X	X	X
.42	Loss of ship's course input	X	X	X	X	X	X
.43	Loss of ship's speed input	X	X	X	X	X	X
.44	Loss of director train input	X	X	X	X	X	X
.45	Loss of 115V 60-Hz	X	X	X	X	X	X

4315.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4316 WATCHSTATION - MK 68 FIRING KEY OPERATOR4316.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the safety precautions that must be observed.
- F. Perform the steps of this procedure.

- .11 Operate salvo alarm
- .12 Operate firing key
- .13 Operate cease fire alarm

A	B	C	D	E	F
X	X	X	X	X	X
X	X	X	X	X	X
X	X	X	X	X	X

4316.2 NORMAL OPERATIONS

- A. There are no normal operations to be discussed.

4316.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received in Gun Plot.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions
 - 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 - 4. How these abnormal conditions affect other watchstations

- .31 Misfire
- .32 Foul bore

A	B	C
X	X	X
X	X	X

4316.4 EMERGENCIES and/or CASUALTIES

- A. There are no emergencies and/or casualties to be discussed.

4316.5 INFREQUENT and/or ABNORMAL OPERATIONS

- A. There are no infrequent and/or abnormal operations to be discussed.

4317 WATCHSTATION - BASIC POINT DEFENSE MISSILE SYSTEM CONTROLLER4317.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure when practicable.

	A	B	C	D	E	F	G
.11 Establish system phone communications	X	X	X	X			X
.12 Light off radar	X	X				X	X
.13 Light off amplidyne	X	X					X
.14 Light off launcher power	X	X					X
.15 Light off missile power	X	X					X
.16 Assign launcher	X	X				X	X
.17 Enable missile	X	X			X		X
.18 Fire missile	X	X	X	X	X	X	X
.19 Light off target designation converter (TDC)	X	X		X			X
.110 Select search pattern	X	X					X
.111 Designate in local mode	X	X	X	X			X
.112 Designate in remote mode	X	X	X	X			X
.113 Select inputs to TDC	X	X	X	X			X

4317.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the indicator light(s).

	A	B	C	D
.21 Lighting off radar				X
.22 Lighting off launcher power				X
.23 Lighting off amplidyne				X
.24 Lighting off missile power				X
.25 Assignment of launcher	X		X	X
.26 Enabling missile				X
.27 Lighting off target designation converter (TDC)				X

4317

4317.2 NORMAL OPERATIONS (CONT'D)

	A	B	C	D
.28 Designation in remote mode		X		
.29 Designation in local mode		X		
.210 Selection of inputs to TDC		X		
.211 Firing missile	X	X	X	X

4317.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Indicate an understanding of the abnormal operations by describing
1. Operating limitations imposed by the abnormal conditions

.31 Simultaneous firing of 5"/54 gun mount at same target	<u>A</u>
	X

4317.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received by the Basic Point Defense Missile System Controller.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:
1. Investigative action performed
- D. Indicate an understanding of the emergencies and/or casualties by describing:
1. Operating limitations imposed by this emergency and/or casualty
- E. Perform the emergency and/or casualty procedure when practicable.

	A	B	C	D	E
.41 Loss of launcher-ready indication	X	X	X	X	X
.42 Loss of missile-enable indication	X	X	X	X	X
.43 Loss of missile-ready indication	X	X	X	X	X
.44 Loss of missile-loaded indication	X	X	X	X	X
.45 Loss of radiate indication	X	X	X	X	X

4317.4 EMERGENCIES and/or CASUALTIES (CONT'D)

	A	B	C	D	E
.46 Loss of 60-Hz indication	X	X	X	X	X
.47 Loss of 400-Hz indication	X	X	X	X	X
.48 Loss of train amplidyne indication	X	X	X	X	X
.49 Loss of elevation amplidyne indication	X	X	X	X	X
.410 Loss of in-range indication	X	X	X	X	X
.411 Loss of lock-on indication	X	X	X	X	X
.412 Loss of target designation converter power	X	X	X	X	X
.413 Loss of sound-powered phone communications	X	X	X	X	X
.414 Missile misfire	X	X	X	X	X

4317.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communications that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Describe the limitation(s) imposed by the use of this infrequent and/or abnormal operation.
- H. Describe the condition(s) that require this infrequent and/or abnormal operation.
- I. Define how the parameter(s) monitored by this watch change during this infrequent and/or abnormal operation.
- J. Perform this infrequent and/or abnormal operation when practicable.
- K. Discuss the setpoint(s).

	A	B	C	D	E	F	G	H	I	J	K
.51 Simultaneous firing of 5"/54 gun mount at same target	X	X	X	X	X	X	X	X	X		X
.52 Operation in surface mode	X	X	X	X	X	X	X	X	X	X	X
.53 Operation in friendly ship mode	X	X	X	X	X	X	X	X	X	X	X
.54 Operation in range interlock bypass condition	X	X	X	X	X	X	X	X	X	X	X
.55 Position launcher for helo operations	X	X	X	X		X	X	X		X	X

4318 WATCHSTATION - MK 76 DIRECTOR ILLUMINATOR OPERATOR4318.1 OPERATING INSTRUCTIONS

For the operating instructions listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communication(s) that must be established and/or utilized.
- E. Discuss the parameter indication(s) that must be monitored.
- F. Discuss the safety precautions that must be observed.
- G. Perform the steps of this procedure when practicable.

- .11 Establish sound-powered phone communications
- .12 Cathode ray tube (CRT) adjustments
- .13 Adjustment of scope focus and filter
- .14 Obtain radar track
- .15 Accept target designation
- .16 Reject radar track

A	B	C	D	E	F	G
X	X		X			X
X	X					X
X	X					X
X	X	X	X	X	X	X
X	X	X	X			X
X	X					X

4318.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. Define the parameter(s) monitored.
- B. Explain how the parameter(s) change.
- C. Describe the meter reading(s).
- D. Describe the CRT presentation.

A	B	C	D
X	X	X	X

- .21 Radar tracking

4318.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received on MK 76 Director.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions
 - 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 - 4. How these abnormal conditions affect other watchstations

4318

4318.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

.31 Operating in the rain

A	B	C
X	X	X

4318.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received by the Director Illuminator Operator.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:

1. Investigative action performed

- D. Indicate an understanding of the emergencies and/or casualties by describing:

1. Operating limitations imposed by this emergency and/or casualty

- E. Perform the emergency and/or casualty procedure when practicable.

.41 Loss of CRT display

.42 Loss of sound-powered phone communications

.43 Loss of radar track

A	B	C	D	E
X	X	X	X	X
X	X	X	X	X
X	X	X	X	X

4318.5 INFREQUENT and/or ABNORMAL OPERATIONS

For the infrequent and/or abnormal operation(s) listed below:

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step of this procedure.
- C. Discuss the control/coordination required by the use of this procedure.
- D. Discuss the communications that must be established and/or utilized.
- E. Describe the limitation(s) imposed by the use of this infrequent and/or abnormal operation.
- F. Describe the condition(s) that require this infrequent and/or abnormal operation.
- G. Perform this infrequent and/or abnormal operation when practicable.

.51 Operate in surface mode

.52 Position launcher for helo operations

A	B	C	D	E	F	G
X	X	X	X	X	X	X
X	X	X	X	X	X	X

4319 WATCHSTATION - SOUND-POWERED PHONES

4319.1 OPERATING INSTRUCTIONS

For the operating instructions

- A. Describe the steps of this procedure.
- B. Explain the reasons for each step.
- C. Discuss the control/coordination of this procedure.
- D. Name the stations on your circuit.
- E. Perform the steps of this procedure.

- .11 Don sound-powered phones and plug jackbox
- .12 Operate phone circuit selector
- .13 Test sound-powered telephone
- .14 Establish communications with other stations
- .15 Maintain circuit discipline
- .16 Use standard terminology
- .17 Properly secure and stow sound-powered phones and jackboxes

X X X X

4319.2 NORMAL OPERATIONS

For the condition(s) or evolution(s) listed below:

- A. List the stations on your circuit.
- B. Explain the information exchanged on your circuit.
- C. Indicate the stations to which you provide information.

- .21 Condition I
- .22 Condition III

A	B	C
X	X	X
X	X	X

4319.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received by the Phone Talker.
- B. List or recite the steps of the corrective action required.

4319

4319.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

C. Indicate an understanding of the abnormal conditions by describing:

1. Probable causes
2. Operating limitations imposed by the abnormal conditions
3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
4. How these abnormal conditions affect other watchstations

	A	B	C
.31 Garbled or broken transmission	X	X	X
.32 Transmitter failure	X	X	X
.33 Earphone failure	X	X	X
.34 Damaged jack	X	X	X
.35 Excessive outside noise	X	X	X

4319.4 EMERGENCIES and/or CASUALTIES

For the emergencies and/or casualties listed below:

- A. Describe all indications and alarms that would be received by the Phone Talker.
- B. List or recite the steps of procedure for the immediate action portion of this emergency and/or casualty.
- C. Explain the reason for each step of the emergency and/or casualty procedure in terms of:

1. Corrective action provided
2. Protection provided
3. Investigative action performed

D. Indicate an understanding of the emergencies and/or casualties by describing:

1. Probable causes
2. Operating limitations imposed by this emergency and/or casualty
3. Other emergency and/or casualty conditions that may arise if this emergency and/or casualty is not corrected
4. How these emergencies and/or casualties affect other watchstations

	A	B	C	D
.41 Loss of communications	X	X	X	X

4319.5 INFREQUENT and/or ABNORMAL OPERATIONS

A. There are no infrequent and/or abnormal operations to be discussed

4320 WATCHSTATION - ASROC SENTRY

4320.1 OPERATING INSTRUCTIONS

For the operating instructions

- A. Describe the steps of this
- B. Explain the reasons for each
- C. Discuss the control/coordination of this procedure.
- D. Discuss the communication(s) utilized.
- E. Discuss the parameter indicators
- F. Discuss the safety precautions
- G. Perform the steps of this
- H. Perform the steps of this

- .11 Recite the eleven (11) general orders
- .12 Utilize communications systems available
- .13 Demonstrate reporting procedures
- .14 Enforce ASROC security regulations
- .15 Use a 45-Caliber ACP pistol

.. ..
X X
X X X X X X X

4320.2 NORMAL OPERATIONS

Explain the evolutions listed below:

- .21 Reporting in
- .22 Relieving the watch
- .23 On watch duties

4320.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES

For the abnormal conditions listed below:

- A. Describe all indications and alarms that would be received by the ASROC Sentry.
- B. List or recite the steps of the corrective action required.
- C. Indicate an understanding of the abnormal conditions by describing:
 - 1. Probable causes
 - 2. Operating limitations imposed by the abnormal conditions
 - 3. Other emergency, casualty, or abnormal conditions that may arise if this abnormal condition is not corrected
 - 4. How these abnormal conditions affect other watchstations

4320

4320.3 ABNORMAL CONDITIONS that could lead to EMERGENCIES and/or CASUALTIES
(CONT'D)

	A	B	C
.31 FZ alarm	X	X	X
.32 ASROC launcher high/low temperature alarm	X	X	X
.33 ASROC magazine high/low temperature alarm	X	X	X
.34 Intruder alert	X	X	X

4320.4 EMERGENCIES and/or CASUALTIES

A. There are no emergencies and/or casualties to be discussed.

4320.5 INFREQUENT and/or ABNORMAL OPERATIONS

A. Describe the sequence of steps of this procedure.
B. Describe the conditions that require this procedure.

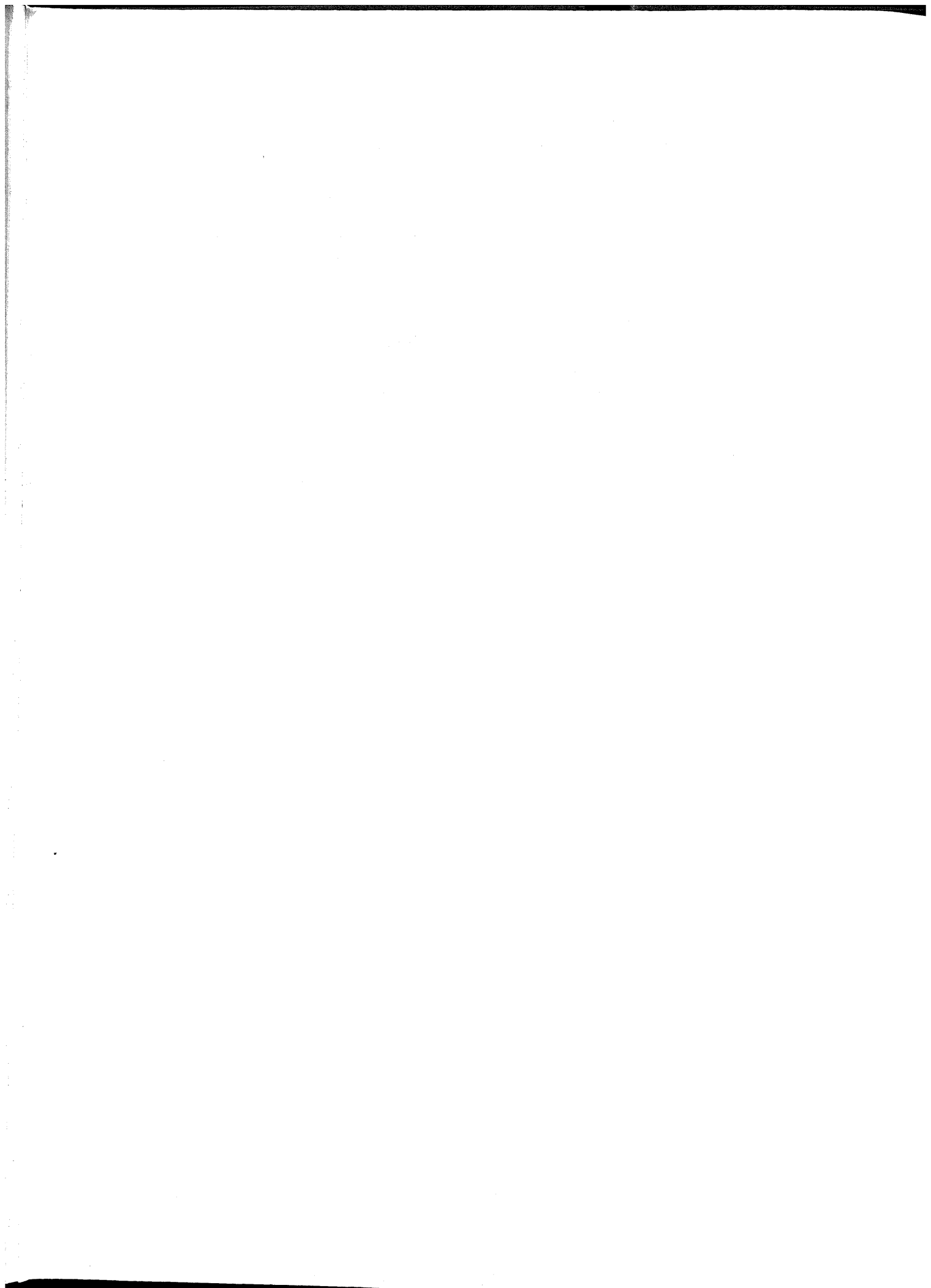
	A	B
.51 Use of deadly force	X	X

BIBLIOGRAPHY

TITLE

PUBLICATION NUMBER

1. Basic Military Requirements	NAVEDTRA 10054
2. Gunner's Mate 3 & 2	NAVEDTRA 10185
3. Fire Control Technician G 3 & 2	NAVEDTRA 10207
4. Fire Control Technician G 1 & C	NAVEDTRA 10208
5. Electrician's Mate 3 & 2	NAVEDTRA 10546
6. Fire Control System MK 114, General Data	NAVSEA OD 18309
7. Ammunition Afloat	NAVSEA OP 4
8. Clearing Of Live Ammunition From Guns	NAVSEA OP 1591
9. Stable Element MK 16 MODS 0,1,3	NAVSEA OP 2209
10. Launching Group MK 16 MODS 0,1,2,3,4	NAVSEA OP 2385
11. Guided Missile Launching System MK 13 MOD 0	NAVSEA OP 2665
12. Position Indicator MK 78	NAVSEA OP 2696
13. Relay Transmitter MK 43 MOD 0	NAVSEA OP 2697
14. Relay Transmitter MK 44 MOD 0	NAVSEA OP 2698
15. Radar Set AN/SPG-53A	NAVSEA OP 2782
16. Attack Console MK 56 MOD 0,1	NAVSEA OP 2892
17. USN Ordnance Safety Precautions	NAVSEA OP 3347
18. Torpedo Tube MK 32 MOD 9	NAVSEA OP 3369
19. BPD Missile System	NAVSEA OP 3467
20. Gun Director MK 68 MOD 0,1,2,3,4,5,6	NAVSEA OP 3480
21. Weapon Control Switchboard	NAVSEA OP 3545
22. SMS Information For Fleet Operational Use	NAVSEA OP 3549
23. BPD Missile System	NAVSEA OP 3656
24. Computer MK 47 MOD 11	NAVSEA OP 3729
25. Guided Missile AIM-7E For BPDS	NAVSEA OP 3744
26. Computer MK 47 MOD 10	NAVSEA OP 3835
27. Gunfire Control System MK 68 MODS 11 and 13	NAVSEA OP 3836
28. 5"/54 Gun MK 42 MOD 9 and 10	NAVSEA OP 3851
29. Control Amplifier MK 163 MOD 0	NAVSEA OP 3860
30. BPDS GM Launching System	NAVSEA OP 3973
31. Magazine Sprinkler Systems	NAVSEA 0348-078-1000
32. Squadron Pre-Mishap Plan	NAVSEA 0901-960-0001
33. Target Designation System AN/SPA-50A	NAVSEA 0967-205-1010
34. Torpedo Countermeasures	NAVSEA 0967-490-1810
35. Torpedo Countermeasures T-MK-6	NAVSEA 250-631-1
36. Safety Precautions	NAVMAT P-5100
37. ATP 28/USN Addendum	
38. CCDP LTR Ser 31/543 of Oct. 26, 1973	
39. COMNAVSURFPAC/LANT Gunnery Notes	
40. FM-23-35	
41. LAMPS Tactical Guide Lines	
42.	NAVAIR 01-260HCD-1
43.	NWIP 50-1
44.	NWP 42
45. NATOPS Manual	
46. Ship's Gunnery Doctrine	
47. Ship's Information Books	
48. Manufacturer's Technical Manuals	



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